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AMERICAN GAS JOURNAL

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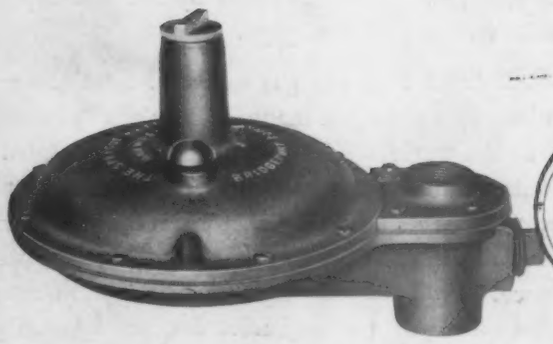

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NATIONAL
STEEL GAS MAINS

AMERICAN GAS JOURNAL, July, 1934, Vol. 141, No. 1. Published monthly by American Gas Journal, Inc., at 34 Crystal St., East Stroudsburg, Pa. Executive and Editorial offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 17, 1928, at the post office of East Stroudsburg, Pa., under the Act of March 3, 1879.

AMERICAN GAS JOURNAL

Established 1859

JULY 1934

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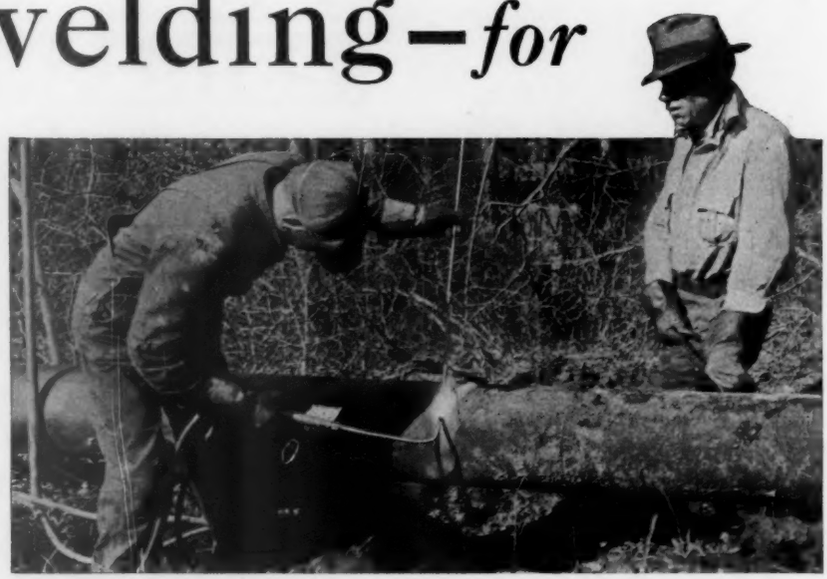
VOLUME 141, NUMBER 1

WHOLE NUMBER 3727

"WE ORDER EVERYTHING FOR PIPE LINE WELDING FROM LINDE"

Lindewelding—*for reclaiming* and *relaying* Pipe



LINDE PROCESS SERVICE has helped many Linde users in reclaiming abandoned pipe lines and relaying the used pipe with welded joints. A recent instance involved the relaying of pipe from an obsolete trunk line into several short gathering lines.

When the pipe was being uncovered, Linde Service men helped to organize the cutting. They aided the company men in getting correct bevels, smooth edges, and regular cuts through the use of the Wagner pipe-cutting machine.

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Pleased with the speed and soundness of the work, officials of the oil company undertook to reclaim usable pipe from many more miles of abandoned systems and to Lindeweld it into new lines. For this work they will continue—as many others do—to order *everything for pipe line welding and cutting from Linde*—in this way assuring the advantages of Linde Process Service.

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Cleveland	New Orleans	
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Editorials

Planning Ahead

AT the recent meeting of the Edison Electric Institute at Atlantic City, N. J., the subject of appliance selling and advertising received special attention. In view of the fact that many franchises for furnishing gas and electricity to one community are controlled by the same company, the discussions apply equally to the selling of domestic gas appliances as to electric.

Allen L. Billingsley, president of Fuller & Smith & Ross, Inc., an advertising agency, stated: "We are told that we are close to a revival of active house building. We must keep, in promotion and planning, quite a few laps ahead of the actual buying market—and several jumps ahead of the house construction interests. We must promote always, this year, next year and the years after, the Home of Tomorrow. When tomorrow comes, we must be there with still newer ideas still bolder electrical developments, for the next Home of Tomorrow.

"This means broad-scale educational work on all the various sections of the building trades, it means having men with pioneering minds in our own organizations who can originate ideas, aid with plans, draw specifications and furnish the inspiration for the progressive planning of true electrical homes."

All of the above applies to sale of domestic gas appliances just as forcibly as to electrical appliances.

Our modern gas ranges will give every service that the electric range will, and more economically. This also applies to gas hot water heaters and space heaters. We also have gas fired house heating apparatus of the highest efficiency, either hot air, hot water or steam with the additional advantages that air conditioning can be hooked up to the house heating installation especially on hot air furnaces.

George E. Whitwell, vice-president in charge of sales of the Philadelphia Electric Co., stated:

"To accelerate the rate of selling of domestic use we must spend real money for advertising and promotional work if we are to divert our way more of the family budget and thus through domestic sales, which will be two and three times those now enjoyed, put ourselves in a position to economically reach low rate levels that will benefit both the customer and us.

"To do it requires vastly increased appropriations which will appear out of line with past experience. But having sold the added load, enforced or voluntary rate reductions will result in so much less loss of net income than that which would have been incurred through the same rate reductions but without the new load, that I do not hesitate to predict that the increased promotional expense will seem small indeed when compared with what the reductions in net income might otherwise have been."

All the above shows what our electrical friends are thinking about and planning for the future to get largely increased output. From the standpoint of first cost and economy of operation the up-to-date domestic gas appliance has many advantages. It is up to our gas company executives to get "sales minded," and give proper cooperation to their sales departments to do an energetic appliance selling job the whole year.

A Sensible Move

THE recent action of Wendell L. Wilkie, president of the Commonwealth and Southern Corporation, in appointing as directors of the parent organization the heads of the principal operating units, cannot be construed as anything but a very sensible move. Admitting that a board of directors is quite necessary to any corporation of size and importance, in shaping a policy of sound financing and general business strategy, we have frequently wondered just what the average director knows of the intimate working of the organization itself. In no mean sense we venture that he is familiar to only a small degree with such inside matters. This must be so, because the average director has never worked for a living in the ranks of the company of which he helps to shape the broad policies.

One can easily envision the beneficial effects of Mr. Wilkie's new kind of a board of directors. Problems of purchasing new and expensive plant equipment, moulding the rank and file into an efficient and loyal body, developing better public relations, and many others will assuredly be sifted out and solved in a highly satisfactory manner by men who are on the regular pay roll of the company, and who have won their spurs by reason of having worked daily with their fellow employees and encountered and mastered such emergencies as a regular occupational diet.

More of similar boards of directors might well be in order.

Plan Now For Househeating

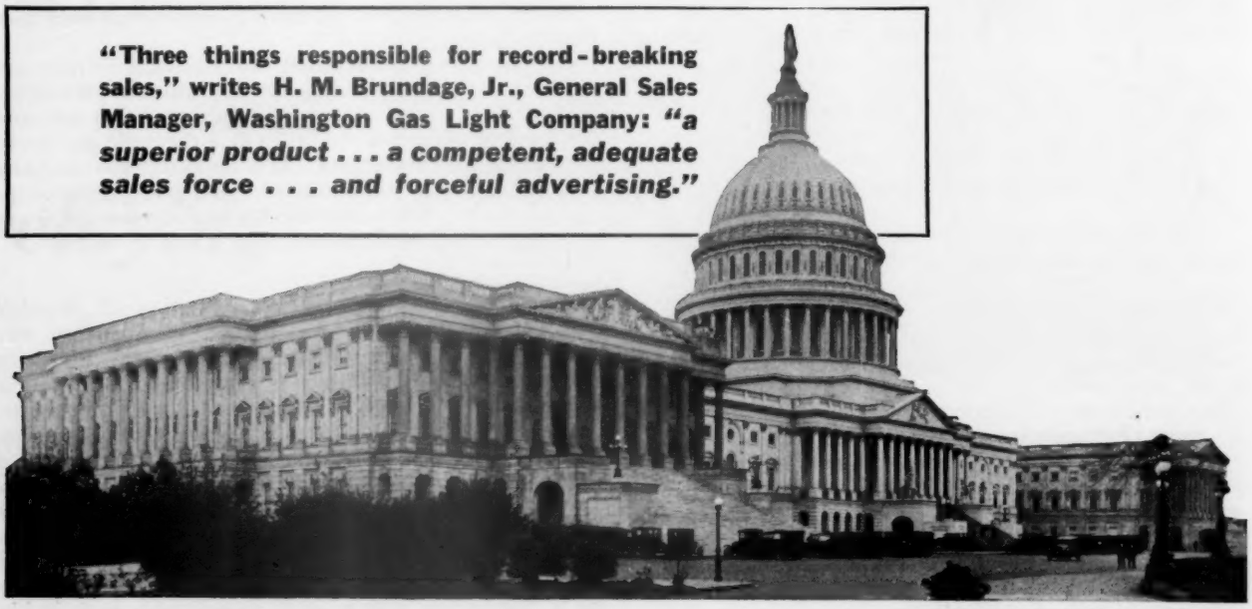
DURING the present sweltering days when Old Sol punishes us right severely, most of us are not overly prone to get into an additional sweat pondering over next winter's househeating worries. Nevertheless, this is a good time for the gas man to lay plans for capturing additional load of this sort. As a material aid in augmenting such increase in output, we believe the current issue of the *Journal*, with several articles on house heating, will fill the bill to a nicety.

WASHINGTON'S

REFRIGERATION SALES FOR MAY

GREATEST IN HISTORY

"Three things responsible for record-breaking sales," writes H. M. Brundage, Jr., General Sales Manager, Washington Gas Light Company: *"a superior product . . . a competent, adequate sales force . . . and forceful advertising."*



DURING the month of May, gas refrigeration sales in Washington *more than doubled* sales during the same month in 1933!

Behind this highly gratifying performance—gratifying not only to the Washington Gas Light Company but to the entire gas industry as well—stands a record of seven years' aggressive merchandising of gas refrigeration in the face of active and outnumbering competition.

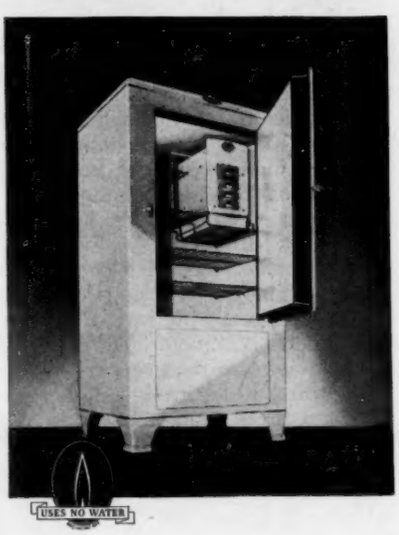
Planned Sales Effort

Thanks to the triple resources of intelligent planning, a well-trained sales force, and effective local newspaper advertising, each year saw a steady increase in gas refrigeration sales as more and more Washington families became acquainted with the vital facts of Electrolux's unmatched advantages.

Today, the opportunities which Electrolux offers to the gas companies of America are greater than ever. The 1934 Air-Cooled Electrolux is unquestionably the finest refrigerator made. In addition to the famous unit, which makes possible its greater economy and permanent silence, Electrolux embodies all those worthwhile conveniences women demand.

Summer Opportunity

With the hot summer weather just beginning, the time is ripe for your company—as for every gas company—to take advantage of Electrolux in insuring that the refrigerators installed in your community are *gas* refrigerators. For assistance in forming your summer sales and merchandising plans, write, wire or phone Electrolux Refrigerator Sales, Inc., Evansville, Ind.



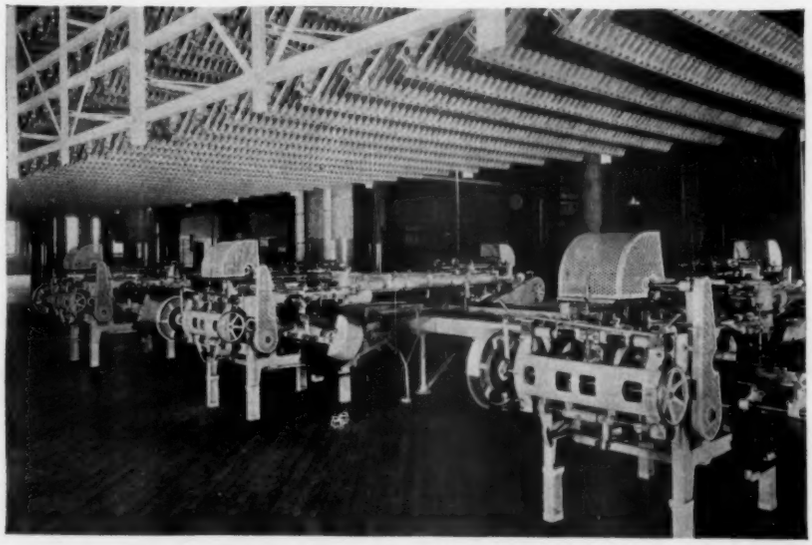
NEW *Air-Cooled*
ELECTROLUX
THE SERVEL *Gas* REFRIGERATOR

AMERICAN GAS JOURNAL
July
1934

Gas Sales in The Baking Field

In Promoting This Class of Business The Value of Contacts Is Stressed and It Is Advised That The Gas Company Push The Direct Gas-Fired Oven

By ROBERT H. STANIFORD
Industrial Sales Manager, The Brooklyn Union Gas Company



Automatic Bread Wrapping and Sealing Machine in a large Bakery. Gas promotes general Cleanliness

THE baking field divides itself quite naturally into three main classes, namely, bread, cake and pie baking. In these three classes the entire equipment in the bakery for the preparation of dough, as well as ovens, is entirely different. The large bread, cake and pie bakers generally use continuous or movable hearth ovens, and the smaller bakers many different types of ovens. Quite naturally the conveyor type ovens lend themselves very nicely to straight line production work, and the smaller ovens offer an excellent means for diversified baking and flexibility.

We must assume before we start, that from both a mechanical and practical standpoint, that it is impractical to interest ourselves in the selling of merchandise to these customers. Our job is to sell fuel. There are obvious reasons why this should be so the principle reason is that invariably the oven is manufactured as a special oven and very often structural changes and strengthening of the building is necessary. It is, however, vital that we familiarize ourselves to the point of complete understanding on all types of equipment and fuels, because so often many of these jobs are decided by oven design and our ability to render service.

The money involved in stocking and delivering this equipment makes it impossible for us to even think about the advisability of becoming interested in the sale of such ovens.

Reams of interesting material have been published under the auspices of the American Gas Association and the Master Bakers' Association, from joint tests conducted in Chicago, as to the relative merits of one fuel against the other; the comparison of one type of oven against another type of oven as far as comparison of bake ovens are concerned.

Needless to say, time prohibits the detailed discussion of this subject; the short of it is that the direct gas-fired oven is the logical oven for gas engineers and Gas Companies to push, and by push I mean to know definitely why this type of oven is superior to others; and to know that our fuel, due to flexibility, cleanliness and ease of control and reliability, and other reasons of fuel advantages, is the logical one to be used in these types of oven.

Statistical information available at the American Gas Association distinctly proves, from a fuel economy

---

Read before New England-New York Regional Gas Sales Conference, New London, Conn., June 28-30, 1934.

standpoint, that the direct fired oven is better than the indirect. Therefore, we as industrial engineers must use every effort to put our heart and soul in our work and insist that the manufacturers of these traveling ovens apply fuel in an intelligent and economical way, and that the introduction of indirect fired systems in this type of oven is entirely taboo as far as we are concerned.

Sales promotional work in this field must be accomplished with a thorough understanding and complete knowledge of the advantages of our fuel, and when these are thoroughly and completely understood, there is very little reason for our great industry to feel alarmed about such an important load as we now enjoy in this field.

Gas Easy To Apply

There is nothing difficult about the application of gas to the various types of ovens. In most cases we have been stupefied by the erroneous information which we received from time to time. We must correct the information at hand, otherwise we will lose our best bets. We have plenty of salesmen and excellent engineers who are armed with facts and possessed with courage and enthusiasm, and should have little trouble in selling the idea of the best type of ovens, and the best service to these customers.

A great many ovens have been sold in the past which were absolutely crude in their design, wherein the baker has been sold the wrong type of equipment, and, as a result, the operating costs and operating performance have been entirely unsatisfactory. We can improve burner application and general efficiency in all types of ovens. We have and are continuing to improve this equipment sometimes 30% by using a little judgment, and by realizing that we have been gullible to a ridiculous extent in accepting too much information without challenging the manufacturer. We must stop the sale of indirect ovens and insist on the sale of direct fired ovens. If they are the best, we want to sell them. They are the best, as has been proven, so let's sell them and do it now before too many indirect ovens are sold. The manufacturers will sell as the demand indicates—we must create the demand.

We can look, for example, to those types of ovens familiarly known as the rotary type, in which the hearth revolves in a plane parallel to the floor. These can be converted, and are being converted very efficiently as far as gas application is concerned. We were losing a great many of this type of equipment to competitive fuels. Now we enjoy the unique position of reclaiming a great many jobs lost and are enthusiastically welcoming these customers back to our lines.

The box cabinet oven of the smaller type, as well as the rotary portable type all have their particular use in the fast growing baking industry, and there is no excuse for any of these types of oven being fired with any other fuel but gas.

You might think, to listen to this paper, that an overly bright light is cast, but the enthusiasm which can be felt when proper attention is given to this type of work is demonstrated every day as this method of approach is applied.

The important phase of our industry today is, of course, a very definite and complete understanding of the tools with which we have to work and, in many cases, the designing of tools which are necessary for the satisfactory introduction of gas for baking purposes.

Without certain engineering ability, and without a very fundamental knowledge of the problems of the baker, it is rather hopeless to believe that the engineering departments in the larger bakeries will have such respect for our representatives; but our salesmen, if armed with this information, and possessed with personality, courage and the ability to talk, will have no difficulty in convincing these bakers that we as gas engineers, are vital to them in their fuel problems. Granting that this is true, it has been very definitely proven that the most valuable single asset that we as industrial engineering representatives of our companies have, is our ability to know our customers intimately, and that the better we know individuals of responsibility in our districts, the harder it will be for our competitors to gain a foot hold. Our friendship with these people will bring an interchange of ideas upon which it is impossible to place a valuation. We will be able to know where our trouble is. We will know competitive fuel situations as well as all fuel problems and manufacturing problems pertaining to the application of heat, which customers can discuss with us on a friendly and understandable basis. With this kind of service and contact available, we can render service, and by rendering service and forming contacts that are worthwhile, you have my idea of the finest sales promotional plan possible.

Gas Company Statistics for April

MANUFACTURED and natural gas companies reported revenues of $62,287,300 for April, 1934, as compared with $59,597,000 in April, 1933, an increase of 4.5 per cent.

Revenues of the manufactured gas industry aggregated $32,869,100 for the month, representing only a slight increase over the corresponding month a year ago. Revenues of the natural gas industry however totaled $29,418,200 for April or 8.9 per cent more than for April, 1933.

Sales of manufactured gas in April for domestic uses were 2 per cent below the preceding year. Sales to industrial-commercial users however registered a distinct upturn, manufactured gas companies reporting an increase of nearly 30 per cent in this class of business, while for the natural gas industry the gain was nearly 33 per cent.

Large gains were reported by the manufactured gas utilities in sales of gas for house-heating purposes which increased more than 44 per cent from the April, 1933, figure.

For the four months ending April 30 manufactured and natural gas revenues aggregated $269,843,300, an increase of 3.4 per cent over the first four months of 1933. Revenues from domestic consumers were unchanged for the period. Revenues from industrial and commercial users however increased 15 per cent over the first months of 1933. —*Paul Ryan, Chief Statistician, A.G.A.*

Gas Distributing System

In a distributing system comprising a low pressure gas main and a high pressure gas main for supplying gas to the low pressure main, a motor is driven by the pressure of gas from the high pressure main which exhausts into the low pressure main and drives a compressor utilizing gas from the high pressure main for supplying gas to an oil atomizer which discharges into the low pressure main. Details of apparatus are described.—*U. S. Pat. 1932537—Koppers Co. of Del.*

Some Thoughts on Cold 70

Stratification of Air Is Not the Cause of Cold 70, Which Condition Is Improved by a Good Grade of Insulation and the Proper Selection and Location of Radiators, Shields and Air Registers

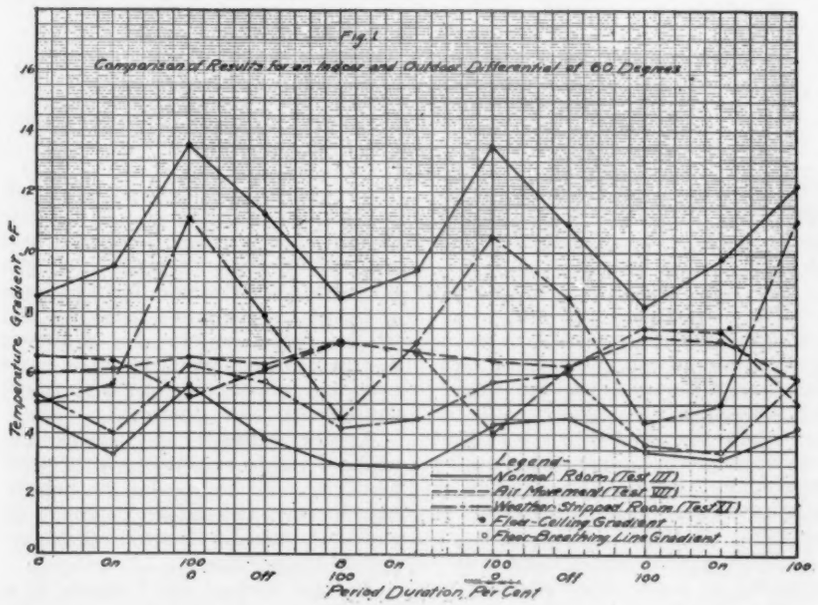


Fig 1
Comparison of Results for an Indoor and Outdoor Differential of 60 Degrees
Temperature Gradient °F
Legend-
Normal Room (Test III)
Air Movement (Test VIII)
Weather Stripped Room (Test XI)
Floor-Ceiling Gradient
Floor-Breathing Line Gradient
Period Duration, Per Cent

By
D. J. HENDRICKSON

THE term Cold 70 has been accepted generally by the domestic heating industry to indicate the condition that exists within a residence when the temperature at the breathing-line level is 70 degrees but still the occupants of the residence are uncomfortable and complain of being cold. It is no more a charge of the gas industry than of the solid and liquid domestic heating industries, although many are of the opinion that it is encountered only in gas-heated homes.

A number of reasons have been advanced as to the cause of the Cold 70 condition. With the use of solid fuels little attention is given to the maintenance of a given constant temperature at a certain point within the home, more attention being given to the maintenance of a comfortable living condition. In many instances it will be found that a temperature as high as 80 degrees is maintained regularly with solid fuels in order to produce a comfortable condition for the occupants. With the modern application of gaseous fuels, thermostatically controlled, to the home-heating field, the theory that with a 70-degree temperature at the breathing-line level a healthful and comfortable condition would be maintained has been propounded generally by the gas industry. Thus with a change from solid to gaseous fuels a change in the occupant's conception of a comfortable condition, and, oftentimes, a decrease of as much as ten degrees in the maintained temperature simultaneously takes place. The net result of such a condition is that a complaint is registered by the customer and a service call is made, with the blame inevitably being placed by the customer upon the installation of the gas burning equipment or the quality of the gas. The remedy usually resorted to has been to increase the temperature at the thermostat to such a point as would produce a comfortable condition within the home; an increase in the gas consumed correspondingly takes place which is the cause of more dissatisfaction by the customer in many cases.

The intermittent action of the gas burner, either conversion or gas-designed type, has received its full share of blame for the Cold 70 condition. The theory often set forth is that during the off-period the air within the residence becomes motionless and stratifies into temperature zones with the cold air sifting in around the doors and windows and settling below the breathing-line level, with an uncomfortable condition existing until the thermostat calls for heat and the air again is set into motion by the on-coming warm air with the result of raising the temperature in the zone of activity.

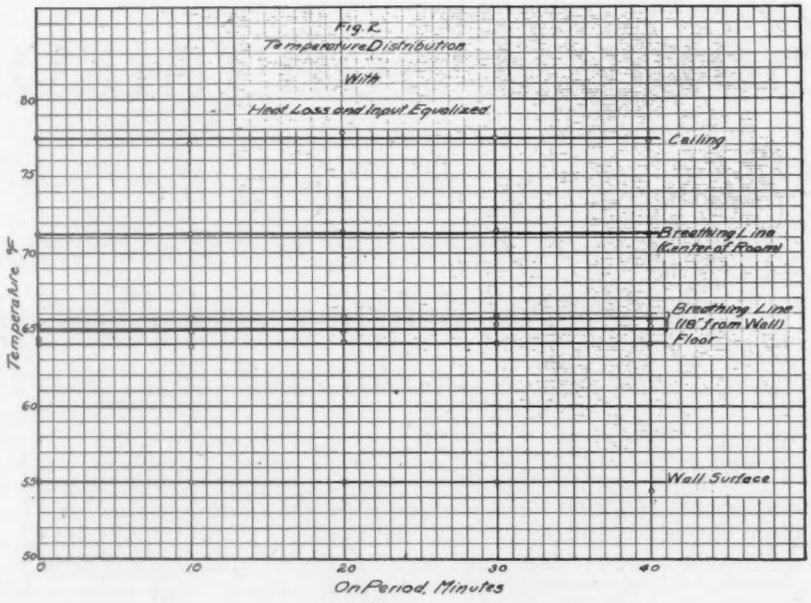
Important Conclusion

Investigations conducted by the author have convinced him that while Cold 70 is a serious problem, it is not a problem pertaining particularly to the domestic gas-heating field. Although it is undoubtedly true that the intermittent action of the burner may result in some stratification of the air into temperature zones, (this would be less noticeable with steam or hot water systems than with warm air), it is evident that it is not the cause of Cold 70 since the condition is encountered with solid fuels where a continual supply of heat is being emitted from the furnace.

In order to make a study of Cold 70 as encountered with intermittent heating the author conducted a series of tests in the Gas Engineering Laboratory at Purdue University. A constant temperature room was used in which was compared the temperature distribution (1) with the room in a normal condition; (2) with air

movement in the room against the natural circulation; and (3) with the infiltration losses reduced to a minimum. A gas-designed, thermostatically controlled, boiler was used.

In order to obtain an accurate picture of the temperature changes throughout the room at various levels, the temperature was taken at eight different points by means of chromel-alumel thermocouples at five-minute intervals throughout three complete cycles of operation. The thermostat, located in the center of the room, was set at 70 degrees with a variation of one degree each way. The thermostat and thermocouples were shielded from the radiant heat rays of the radiator. These readings were taken for temperature differentials between indoor and outdoor of 20, 40, 60 and 80 degrees. A comparison of results for a 60-degree differential is shown in Figure 1.



The following conclusions were reached as a result of these tests:

What Tests Showed

(1) The Cold 70 condition increases in effect as the temperature differential between the indoor and outdoor atmosphere is increased.

(2) While the intermittent action of the heating unit, either conversion or gas-designed, may increase the effect of Cold 70, it is considerably less pronounced in case the infiltration losses are reduced to a minimum. Due to the intermittent action of the unit the degree of Cold 70 fluctuates widely during the cycle of operation.

(3) The cooling action of the cold wall on the adjacent air is more pronounced during the off-period. This defect can be corrected only by increasing the wall surface temperature by insulating the outer walls and weather-stripping the doors and windows.

(4) Air movement against the natural circulation tends to reduce the fluctuation of the temperature gradient during the cycle of operation, and undoubtedly, if properly applied for the particular installation, will reduce the Cold 70 condition.

Tests also were conducted to determine the effect of a continuous on-period upon the Cold 70 condition in regard to the stratification of the air into temperature zones. For these tests the heat admitted to the room was regulated so as to counterbalance the heat losses. Figure 2 gives a graphical representation of one of these tests. It can be seen that the continual supply of heat had little effect upon the temperature gradient. Hence with an average home, Cold 70 would still be present with the ideal heat regulation—i. e., the heat losses from the home being constantly equalized by the heat input.

The fact that the temperature gradients (floor-ceiling and floor-breathing line) increased with an increase in the indoor and outdoor temperature differential in the above-mentioned tests, together with the fact that the co-efficient of heat transmission for a wall decreases by improving the type of construction, raises the question as to the effect of insulation on Cold 70. By insulating a wall, the co-efficient of heat transmission (U) is decreased which gives a higher inside surface temperature (t1) in the equation

$$U(t - t_o) = f_i(t - t_i) \ldots\ldots (1)$$

in which

- U = Rate of heat transmission, B.t.u. per hour, per square foot of surface, per degree temperature difference.
- t = Indoor temperature, degree F.
- t_o = Outdoor temperature, degree F.
- f_i = Inside film or surface conductance; the amount of heat in B.t.u. transmitted by radiation, conduction and convection from the air to the inside surface per hour, per square foot, per degree temperature difference between the surface and the surrounding air.
- t_i = Indoor surface temperature, degree F.

With a higher surface temperature the difference in the body temperature and the wall surface temperature is reduced, which results in a reduced amount of heat lost by the body by radiation in accordance with the well-known laws of radiant heat which states that the rate at which heat is radiated from one body to another increases as the fourth power of the absolute temperature. Consequently the Cold 70 effect is reduced to a marked degree with a good grade of insulation installed. Also, with an insulated structure the heat is held within the residence for a longer period with the result that the walls and objects within are radiating heat to the colder objects for a longer period of time, resulting in a more even temperature distrubution throughout the residence.

Another cause for the body feeling uncomfortable even though the temperature is 70 degrees at the breathing-line level is a misarrangement of one of the factors that control the effective temperature.

The comfort of the body is, to a large extent, dependent upon the body temperature, and consequently upon the relation between the rate of heat produced and dissipated. In order to maintain a constant body temperature, the heat losses must equal the heat production; a reduction in the rate of heat elimination from the body results in a corresponding rise in temperature and a feeling of discomfort.

Effective Temperature

When one considers the varying atmospheric temperatures and relative humidities that are encountered, it readily is seen that certain combinations of wet and dry-bulb temperatures and relative humidities exist that produce the same total heat loss by the three methods—convection, radiation and evaporation—and consequently the same degree of comfort upon the body. Effective temperature is defined as "an experimentally determined scale which unlike the wet and dry-bulb scaler is a true measure or index of a person's feel-

(Continued on page 33)

Reminiscences

Early Experiences with Carburetted Water Gas Manufacture

By ALFRED E. FORSTALL

Forstall, Robinson and Luqueer

AS has been mentioned, my first connection with the gas business was in plants making nothing but coal gas. In fact, at that time, all the old time gas men resented the activity of the carburetted water gas promoters as perniciously pushing, under threat of competition, an uneconomical method of making gas. This belief as to lack of economy was well founded as long as fifteen to sixteen candle power gas satisfactorily met the demands of gas consumers. The position was altered, however, by the advent of electric lighting and its gradual coming into competition with gas lighting.

To meet this competition it became advisable to increase the illuminating value of the gas and, while this could be done by the use of cannel coal, carburetted water gas of high candle power offered advantages as an enricher for the gas made from ordinary gas coal.

Demands of Workmen

In the case of the Chicago Gas Light & Coke Co., however, the decision to manufacture water gas was brought about by wage and hour demands made by the retort house men early in 1886. At that time the labor unions in Chicago began agitating for an eight hour day with an increase in the hourly wage. This was accompanied by great activity among the radical elements in the city.

The Chicago company did all the street lighting of the North and South Sides of the city, and, under the existing conditions, any failure of this lighting might have furnished opportunity for rioting even more serious than that which actually occurred and was climaxed by the disastrous bomb explosion in Haymarket Square on the West Side.

This was the situation when the retort house men, with the threat of a strike, demanded an eight hour shift with wages of $2.50 in place of one of twelve hours at $2.75, an increase of 36% in the cost of retort house labor. The men were told by my father that, with the existing competition, the increase in the cost of manufacturing coal gas involved by the higher wages would make it necessary to substitute carburetted water gas for at least a substantial part of the coal gas then being made and that this substitution would decrease the number of men required and, therefore, many of them would lose their jobs as a result of the granting of their demands.

In spite of this warning the stokers maintained their attitude and, feeling that their responsibility for the public safety precluded a fight with the risk of an interruption in the supply of gas, the directors granted the demands.

The warning was not given idly, and steps leading to installation of carburetted water gas apparatus were soon taken. Since the Consumers Gas Co., the competing company, owned the right to use in Chicago the Lowe apparatus, another make had to be chosen, so in June 1886 a contract was made for the erection at the North Station of two 7 ft. double generator Hanlon-Leadley sets. These were built and ready to operate by the end of that year.

Lack of Relief Holder

During the summer and autumn of 1886 a holder had been built to complete the section of plant the other parts of which had been built the year before. Thus when the manufacture of water gas began, there was available a complete unit to keep the handling of that gas entirely separate from that of coal gas. But this unit did not include a relief holder, the gas, as made in the sets, passing directly to and through the condensers, purifiers and station meter into the storage holder. This lack of a relief holder was the cause of some operating difficulties, but we ran the plant for several years under this handicap.

Each Hanlon-Leadley set consisted of two generators, communicating through an arch connecting the two ash-pits, two steam superheaters and one fixing chamber.

Each superheater had a steel shell lined with fire clay blocks and provided with a stack valve. The interior was filled with checker brick and its bottom was open to the connection between the side of the corresponding generator near its top and the side of the fixing chamber near its bottom. In this connection there was also, between the superheater and the fixing chamber, a water-cooled valve immersed in water contained in a cast iron tank.

The fixing chamber was provided with three gas take-offs coming out from one side and sealed in the same washbox. The lowest was one-third and the middle one two-thirds of the height of the fixing chamber above the bottom, while the upper one was just below the top. The lower end of each take-off could be closed by a mushroom-shaped valve.

Operating the Sets

In operating the sets the generators were blasted in parallel, part of the blow gases being allowed to pass out through the stack valve of one superheater and the remainder going through the fixing chamber. When that chamber and the generator fires were at the proper temperatures, the blast was shut off and all the stack valves and the water-cooled valve between the fixing chamber and the superheater which had been heated during the blow were closed. Steam was then turned into the top of the hot superheater, passed down through it into the top of the corresponding generator, down through that and over into and up through the other generator, at the top of which the carbureting material was admitted. The mixture of water gas and hydrocarbon vapors passed on to and up through the fixing chamber. At the beginning of the run the bottom gas take-off was open and the other two were closed, so the carbureted gas was acted on by only one-third of the checker brick. When one-third of the time allotted to the run had elapsed, the middle take-off was opened and the bottom one closed. For the final third of the run the top take-off was open and the other two closed. This

handling of the gas take-offs was based upon the belief that when the checker brick were hot the shorter time of contact was sufficient to convert the oil vapors into fixed gas but that, as the bricks cooled down additional time must be allowed.

The men who started up the sets for the contractors taught us the proper manipulation of the valves for changing from blow to run and back again, and for alternating the supply of steam to the superheaters and of naphtha to the generators, but knew very little about the science of carburetted water gas making and we had to work that out for ourselves. This we did through much tribulation.

Using anthracite coal as generator fuel and for carbureting material what was then known as naphtha, but would now be considered a high grade gasoline, we started out with a forty minute cycle equally divided between blow and run. Even with the extended contact between steam and carbon furnished by the two fuel beds worked in tandem, this was poor operation in the light of our later knowledge.

Rapid Clinker Formation

From the description of the course of the steam through the fuel beds, previously given, it is evident that all the runs were down runs made with superheated steam. No thought was given in that day to the fusing temperature of coal ash, so I do not know what it was in our case, but it certainly was not high enough to stand that treatment without the formation of clinker. And how fast the clinker did grow out from the walls! In spite of strenuous work in barring down on each of the two cleanings per day of the fires, after a set had been run two or three weeks there was at the clinker line of each generator only an opening with a diameter little, if any, more than 12 or 15 inches. Then it was necessary to start up the other set, shut down and cool off the one which had been running and put a team of two men at work with hammers and wedges cutting out the clinker in the generators. By the time this job was finished the active set had become clinkered up and another changeover had to be made. After working this way for several months we did try making an occasional run admitting steam at the bottom and naphtha at the top of each generator with both hot valves open. Unfortunately the bottom steam connections which we made were too small and we obtained very little relief. Later, however, with larger steam pipes for up runs and making one such run for each two normal ones, the clinker problem was solved and as far as generator operation was concerned a set could be run indefinitely.

This clinker trouble was trying and expensive in the way of increased operating costs, but it was much less spectacular and startling than that caused comparatively early in the proceedings by insufficient fixing of the naphtha vapors. The North Station was located on the north branch of the Chicago River, a stream which at that time was so polluted that the addition of a little gas works drainage was nothing to worry about and the overflow from the washboxes of the sets ran through a works sewer directly into the river. A large wooden coal shed occupied the whole river frontage of the works. In winter this shed was well filled with coal and the only way of getting down to the river was through a tunnel under the coal. Operation of the sets was begun in cold weather with the outdoor temperature well below freezing and the river frozen over. As far as the operation of the coal gas plant was concerned there was no occasion for any inspection of the river front and days might, and did, pass without any one going down to it.

Wishing to make gas of high illuminating value, we were using between five and six gallons of naphtha per 1000 cu. ft. and our operating knowledge was not sufficient to show us that, as later events proved, this was not being thoroughly converted into gas. At least part, and a very inflammable part, of the unconverted portion was running from the washbox into the sewer and accumulating on the water in the unfrozen area at its mouth and even on top of the ice covering the rest of the river surface.

Boom!

With the stage thus set, one morning a workman entered the outhouse, located directly above the sewer, lighting his pipe as he stepped inside the door and throwing the still burning match down through the long slot opening. There was an immediate burst of flame which shot out the river end of the sewer and set fire to the oil on the water and ice. A strong wind blew the flame across the narrow dock and against the coal shed wall and in a jiffy this was well ablaze. The fire was in a position hard to reach from the land side, especially since it was necessary to work against the wind, but fortunately a fire boat, just preparing to leave the scene of an earlier fire less than a quarter of a mile down the river, was able to make a quick trip up to us and put out our fire before it had done any serious damage.

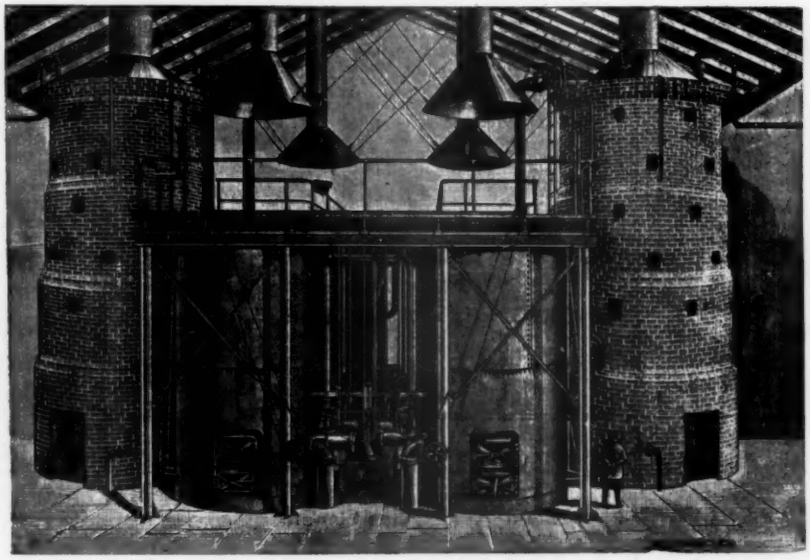
After this fiery baptism we cut down the amount of naphtha used and were more careful to see that what was used was converted into gas. We also soon learned that it was advisable to shorten the blows and runs and finally reached a point where, irrespective of time, each blow was continued, but only until the desired temperatures were reached in the generators and fixing chamber while each run was stopped when the rate of make dropped to a point which seemed to be the minimum for economical operation. Since we were sending the gas as made directly through the condensers, purifiers and station meter it was an easy matter to equip the meter with electrical contact points and run wires by means of which a bell was rung on the gas-maker's desk every time the meter registered 1000 cu. ft.

Output Increased

Shortening the cycle increased the output per twenty-four hours of the sets from the 500,000 cu. ft. at which they were rated up to 750,000 cu. ft. As an offset, the generator fuel used per 1000 cu. ft. made also increased and it was necessary to balance the saving in labor cost against increase in fuel cost to determine the rate of make which produced the lowest over-all cost of gas. My recollection is that we did not get below a fifteen minute cycle as an average, but, considering that all the valves,—blast, hot, oil, stack and steam,—had to be operated by hand and the generator blast valve and fixing chamber stack valve levers were fifteen feet apart, this was not as bad as it seems when compared with the short cycles of the automatically operated sets of 1934.

In spite of our troubles the manufacture of carburetted water gas proved economical and in the Summer of 1887, by which time it had become possible for our company to use the Lowe patents, a contract was made with the United Gas Improvement Co. for the installation of two "Humphreys Settings" consisting of four 7 ft. 6 in. double superheater sets connected together in pairs. This type of apparatus had just been designed under the direction of Alex. C. Humphreys, then General Superintendent of the U. G. I. Co. and we had the first ones built.

Each setting consisted of two double superheater sets, such as later



The Wilkinson Water Gas Apparatus

became standard design, the generators of which were connected below the grates. The sets were blown in parallel, exactly as if each was a separate unit, but on the run steam was admitted at the top of, say, the right hand superheater, passed down through that into and up through the carburetor and, reaching the top of the right hand generator highly superheated, continued on its way down through the fuel bed. The water gas formed passed with any steam still undecomposed up through the fuel in the left hand generator and into the top of the corresponding carburetor. The enriching oil was introduced here and the resulting mixture of oil vapors and water gas travelled on through the carburetor and superheater. On the next run steam was admitted at the top of the left hand superheater and the flow through the set was in the reverse direction.

Operation of Blast

Supported on the top of each carbureter there was an air blast heater consisting of two rectangular chambers connected by boiler tubes expanded into the plates forming the adjacent sides of the chambers. The blast pipes were so connected to these heaters that the blast as it came from the blowers entered one of the chambers of each heater, which was divided into two compartments by a horizontal plate, passed through the upper rows of tubes to the other chamber and back through the lower rows of tubes to the bottom compartment of the first chamber and on to the various blast valves of the set. In the top of each carbureter was a small stack valve which was opened during the blow to permit some of the blast gases to pass up around the tubes and heat the air flowing through them.

Depths of Fuel Bed

The object of connecting the generators together in these sets was to obtain the conditions of a shallow fuel bed for the blow and a deep one for gas making. To secure this advantage all the runs were intended to be made down and in addition the steam was to be superheated. When worked in this way the sets could not be operated for any long continuous period and it was necessary, as with the Hanlon-Leadley sets, to adopt the practice of making up runs in parallel and in sufficient number to control the formation of clinker.

It was also the intention to use bituminous coal as generator fuel, charging the coal into the generators alternately at the end of a blow so that each charge would be, at least partially, carbonized by the water gas passing up through it on the ensuing run, thus conserving the coal gas formed. They were operated for a short time on bituminous coal, but the rate of make was so much lower than that with anthracite coal or coke that any saving in cost of generator fuel was wiped out by increase in cost of labor.

The use of the air blast heaters also failed to produce any decided economy and, after those on one set had been wrecked by an explosion in the blast piping system, they were removed.

In order that the new features in the design of the "Humphreys Setting" should be intelligently and carefully tried out, their starting up and operation for a trial period were under the direct personal supervision of Arthur Glasgow and we in Chicago learned from him a great deal about the art of making carburetted water gas.

After the start with these installations the change over from coal to carburetted water gas in the works of the Chicago Gas Light & Coke Co. went on steadily until by 1890 the manufacture of coal gas had entirely ceased.

Reverting to the attempted use of bituminous coal as generator fuel, just about the time that we were trying it out Rew designed an apparatus for the use of this fuel in which the coal, charged into the upper end of a long inclined connection between the generator and carbureter, was supposed to be carbonized before it reached the generator by the heat of the water gas and the blast gases as they passed over it on the way from the generator to the carbureter. Rew, who, unlike most inventors, had money of his own, tried very hard to obtain permission to build one of his sets in a works in Chicago, but could not convince any of the officials that it would be successful. He finally secured its adoption in a gas works built in Kansas City, Mo., by a new company formed in the early nineties to compete with the gas company already in existence there, but operation with bituminous coal was not successful although they could run fairly well on coke.

Use of Bituminous Coal

In 1896 I was employed by the owners of the older Kansas City company to make a quick inventory and valuation of the plant of the competing company, prior to its purchase by the former to end the competition. While I was at the plant its operators, wishing to impress upon me the value of the Rew apparatus, tried to run it with bituminous coal but this so reduced the rate of make that the holder was in danger of landing and it was necessary to go back to the use of coke.

After these trials in the late eighties and early nineties the attempt to use bituminous coal as water gas generator fuel was abandoned for many years. When it was again taken up it was carried through to a successful conclusion.

My position with the Chicago Gas Light & Coke Co. was given up in 1890 and my next job was as in-

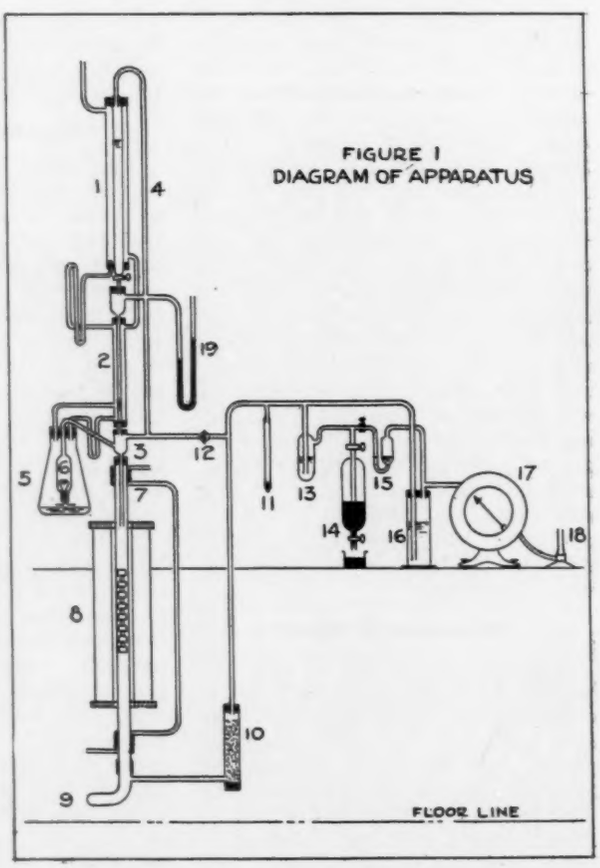
(Continued on page 18)

The Catalytic Effect of Soda on The Reaction Between Steam and Carbon from The Pyrolysis of Low Grade Oils

By MARTIN A. ELLIOTT *with* WILBERT J. HUFF
Department of Gas Engineering, Johns Hopkins University

THE catalysis of the reactions between carbon and carbon dioxide, and between carbon and steam are matters of considerable practical interest, and the patent art extends at least as far back as 1867.[18] With developments in synthetic hydrogen production, and the advance of scientific research in gas engineering, these catalyses have received considerable attention from workers in this country and abroad since the World War, and the accelerating effects of a number of substances such as the alkali and alkali earth bases, and of alkaline forms from the iron group have been well established [1, 3, 8, 9, 11, 12]. A recent American paper[4] seriously proposes the commercial merits of sodium carbonate as an aid in producer gas making, but holds that the high production of carbon monoxide during the blasting period with attending potential heat loss would render the use of such a catalyst in water gas manufacture undesirable.

While this may be true for the generator carbon, the same considerations do not apply to the carbonaceous deposits left in the checkerbrick of the carbureted water gas machine, since this relatively inert material may be largely lost for gas making purposes. Moreover, as its deposition may occur chiefly during an oil injection period coincident with an early portion of the steam run, catalysis presents the attractive possibility that much of this carbon may be gasified before the blasting phase begins, thus minimizing potential heat losses. The gasification of the relatively inert carbonaceous matter deposited by the oil has achieved added importance with the wide use of low grade, high carbon residuum oils, such as "Bunker C," as carburetting agents in American water gas practice. Because of the sluggishness of the steam-carbon reactions at the temperature of the carburetor, American practice ordinarily depends upon combustion with air for the removal of such deposits (6), (7), (10), and some processes secure favorable temperature levels by throwing heavy oil directly onto the fire (3).



Such considerations indicated that it would be desirable to investigate the catalysis of the gasification with steam of the heavy oil carbon as deposited on checkerbrick surfaces at temperatures encountered in water gas practice. The experimental work about to be described was planned for this purpose. Among other differences, it will be noted that this work, unlike some prior studies, did not in-

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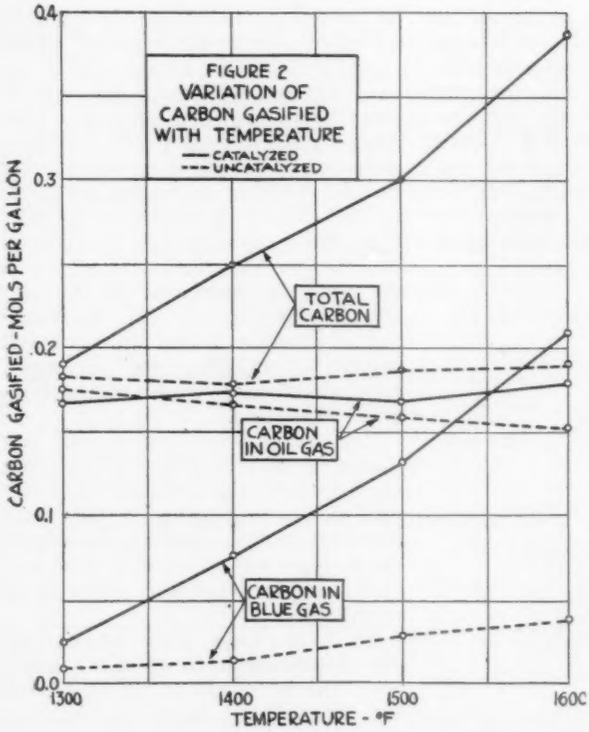
The experimental material in this paper has been abstracted from a dissertation presented to the Board of University Studies of the Johns Hopkins University by Martin A. Elliott in partial fulfillment of the requirements for the degree of Doctor of Philosophy, June, 1933.



volve premixing to secure intimate contact between carbon and catalyst

Apparatus and Materials.—A diagram of the apparatus employed is shown in Figure 1. Essentially, this provided means for the delivery, at predetermined rates, of steam and a viscous petroleum residuum oil to heated refractory surfaces untreated or impregnated with sodium carbonate or other catalytic materials. Facilities, 9, 10, were arranged for removing and collecting the tar from the gas produced, for sampling the gas, 14, and, after removal of its corrosive impurities, metering this, 17 The oil rate, about 0.2 cc. per minute was controlled by keeping a constant head of oil on a small capillary tube, 2. To maintain it at a uniform and constant temperature, and at the same time reduce the oil viscosity so that it would flow easily, all of the oil feeding equipment was steam jacketed.

The steam rate was controlled by regulating the current input to an immersed platinum heating coil of known resistance. The vaporizer, 6, was jacketed with boiling water, so the immersed coil supplied only the latent heat of vaporization. About 0.15 gram of steam per minute was fed to the reaction tube.

Thus tube 13/16 inch (2.1 cm.) internal diameter and 42 inches (106.7 cm.) long, was made of the chromium-steel alloy known as Allegheny metal. Silica and porcelain tubes are subject to attack, by alkali and were therefore deemed unsatisfactory. Comparative experiments were, however, made with this and a silica tube and showed only slight differences. The tube was heated electrically as shown, 8, and the ends water-cooled, 7, to permit attachment of other parts of the apparatus. Tar and condensed steam were collected in a trap, 9, at the bottom of the apparatus. Tar fog was removed by a cotton filter, 10. The gas sample was collected over mercury in a Frazer and Hoffman sampling tube, 14. In the uncatalyzed experiments, a caustic soda scrubber, 16, was used to remove carbon dioxide and hydrogen sulfide before it passed to the meter. This scrubber was by-passed around the sampling tube and the gas was scrubbed with cadmium acetate, 13, before sampling. In the catalyzed experiments, a cadmium acetate scrubber was substituted for the caustic scrubber because of the greater quantity of carbon dioxide produced.

Small magnesia blocks, 11/16 inch x 3/8 inch x 1/2 inch (17.5 mm. x 9.5 mm. x 12.7 mm.), were sawed from commercial magnesia brick supplied by the Harbinson-Walker Company to furnish the refractory surface. To insure analogous conditions, the same blocks were used in all comparative experiments, the carbon being burned off at the conclusion of each. When the effect of soda was studied, the blocks were impregnated with 5 per cent of their weight of sodium carbonate. After each catalyzed experiment, they were leached with hot water and then re-impregnated. Once impregnated, they were never again used in an uncatalyzed experiment.

The oil used was supplied by the Baltimore Branch of the Standard Oil Company of New Jersey. It was a "Bunker C" containing 1.6 per cent sulfur and gave 13 per cent coke.

Procedure.—After the reaction tube had been brought to the desired temperature it was purged for about ten minutes with steam. Oil was then admitted at the predetermined rate. The collection of the gas sample was begun about twenty minutes after the oil admission, and was discontinued ten minutes before the experiment was stopped. The hydrogen sulfide concentration of the gas was determined while the experiment was in progress. Before and after each experiment the steam vaporizer, cracking tube, tar trap, and tar filter were weighed.

In the gas, the percentages of carbon dioxide, illuminants and oxygen were determined by absorption, using an Orsat of the Bureau of Mines type, equipped with automatic pipettes which will be described in a note by one of us. Hydrogen and carbon monoxide were determined by preferential combustion over copper oxide. A modification of the usual handling with copper oxide was found desirable and will be described elsewhere in a brief note by one of us. The saturated hydrocarbons were assumed to be methane and ethane and were determined by slow combustion.

The composition and heating value of the illuminants were calculated according to the method proposed by Watson and Ceaglske[4] which involves a slow combustion of a portion of the original sample in addition to the usual analytical data.

Experimental Results

Preliminary.—Preliminary comparative experiments at about 1650°F. (899°C.) with and without unpregnated refractories showed marked increases in the blue gas generation, the carbon gasified, the thermal yield and a reduction in the per cent of carbon deposited when the refractory was impregnated with sodium carbonate.

With this encouragement, experiments were performed to determine the catalytic effects at checker chamber temperatures encountered in the commercial production of carbureted water gas. No attempt was made, however, to dictate experimental conditions favorable to efficient oil cracking, and, in fact, a large deposition of carbon, at least in the uncatalyzed experiments, was desired.

Gasification of Carbon.—The increased gasification of carbon resulting when the refractory was impregnated with sodium carbonate is shown in Figure 2. Although this increase was only slight at 1300°F. (704°C.) it became more marked at the higher temperatures, thus at 1600° F. (871°C.) about twice as much carbon was gasified when the refractory was impregnated with soda. The carbon appearing as the monoxide and dioxide is designated as the carbon in the blue gas. The curves in Figure 2 show that the increased gasification found in the catalyzed experiments is due chiefly to the production of greater quanti-

ties of blue gas. Thus, at 1600°F. (871°C.), 86 per cent of the increase in the total carbon gasified was due to the increase in the amount of carbon appearing as the monoxide and dioxide.

The variations in the steam decomposition in the catalyzed and uncatalyzed experiments are shown in Table I. When the catalyst was present, the percentage of steam decomposed rose markedly at the higher temperature.

Table I
VARIATION OF STEAM DECOMPOSITION WITH TEMPERATURE IN CATALYZED AND UNCATALYZED EXPERIMENTS

Temperature °F.	Mass velocity of steam * lbs./sq. ft. free cross section/hr.	Mass velocity of oil * lbs./sq. ft. free cross section/hr.	Lbs. steam/ gal. oil	Steam decomposition Per cent
Uncatalyzed				
1300	11.2	13.9	6.3	5
1400	10.5	14.1	5.9	6
1500	11.1	13.7	6.4	12
1600	11.6	13.5	6.8	15
Catalyzed				
1300	10.3	13.5	6.0	13
1400	7.9	12.6	5.0	41
1500	9.3	13.7	5.4	62
1600	11.2	12.7	7.0	67

* Free cross section area = .00181 sq. ft.
Volume of free space = .00393 cu. ft.

As would be expected, the increased carbon in the blue gas was accompanied by a decreased deposition of carbon, and at 1600°F. (871°C.) the refractory at the conclusion of the catalyzed experiment was practically free from carbon, whereas in the uncatalyzed experiments little variation was noted in the quantity of blue gas and amount of carbon deposited over the temperature range studied.

When the refractory was impregnated with soda, slightly more carbon appeared as methane, ethane, and illuminants, designated in Figure 2 as carbon in the oil gas.

Variations in the Heating Value.—The variations in the heating value of the gas made are shown on Figure 3. Because of the increased blue gas generation with the impregnated refractory, the heating value per unit volume of total gas decreased, but as this decrease in calorific value was not as rapid as the increase in the total volume of gas generated, the thermal yield from the oil increased when the catalyst was present. In the calculations, the total of the hydrocarbon gases and hydrogen, corrected for the hydrogen corresponding to the carbon oxides of the blue gas, was designated as the oil gas. It will be noticed that only slight differences in the heating value of the oil gas were observed in the catalyzed and uncatalyzed experiments at 1300°F. (704°C.) and 1400°F. (760°C.). At higher temperatures, the thermal content of the oil gas was noticeably greater when the refractory was impregnated with the catalyst, and this increase was accompanied by a decrease in the quantity of oil gas obtained per gallon of oil. This suggests less extensive pyrolysis in the catalyzed experiments and will be discussed later.

Thermal Yields.—The thermal yields, per unit of oil decomposed, are shown in Figure 4. While no difference is shown in the total yield at 1300°F. (704°C.), at the higher temperatures decided increases in thermal yield were found in experiments in which the refractory was inpregnated with soda. Thus at 1400°F. (760°C.) the increase amounted to about 25 per cent, and at 1600°F. (871°C.) the increase was about 72 per cent. These increases were due to the greater thermal yields from the blue gas, as shown in Figure 4.

Influence of the Catalyst on the Pyrolysis of the Oil.—As shown, at the same temperatures, wide variations in the composition and quantity of the gas produced and the quantity of the steam decomposed, were found between the catalyzed and uncatalyzed experiments. Because of these variations, the conditions governing the pyrolysis of the oil were different, making it impossible to determine whether the variations noted in the oil gas composition resulted from the direct action of the catalyst or from the secondary effects due to the changed conditions. In the catalyzed experiments, the increased partial pressure of the hydrogen and carbon monoxide, for example, favored the production of a high quality oil gas.

The quantity of tar formed per gallon of oil was approximately the same in both the catalyzed and uncatalyzed experiments at the same temperature. The absolute amount of tar formed was so small that it was not deemed advisable to attempt an analysis.

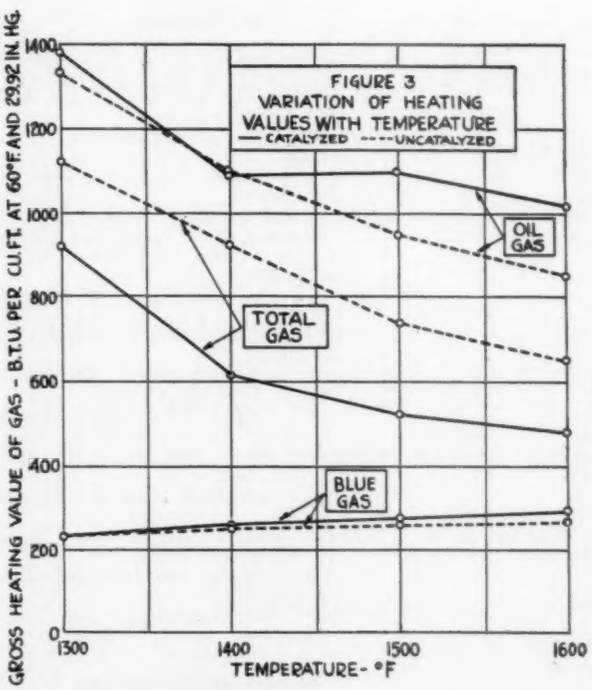
To secure more information upon the direct influence of the catalyst upon the pyrolysis of oil, catalyzed and uncatalyzed experiments were carried out at 1600°F. (871°C.) in which blue gas was added in the uncatalyzed experiment in such an amount that the total gas issuing from the cracking tube per unit oil input was the same as that in the catalyzed experiment. The observations are compiled in Table II. The thermal yield and the yield of the gaseous hydrocarbon constituents were approximately the same in both catalyzed and uncatalyzed experiments performed under comparable oil cracking conditions. So far as may be judged from this evidence, then, under these experimental conditions the soda was without any marked effect upon the pyrolytic reactions.

Character of the Illuminants.—In

Table II
COMPARISON OF RESULTS OF CATALYZED AND UNCATALYZED EXPERIMENTS UNDER COMPARABLE OIL CRACKING CONDITIONS,* BUT WITH BLUE GAS ADDED IN THE UNCATALYZED EXPERIMENT

Experimental conditions	Uncatalyzed + Blue Gas	Catalyzed
Temperature—°F.	1600	1600
Mass velocity of steam **—lbs. per sq. ft. free cross section per hr.	11.4	9.7
Mass velocity of oil **—lbs. per sq. ft. free cross section per hr.	13.7	12.4
Total gas issuing from cracking tube—cu. ft. per gallon ***	191.1	184.7
Blue gas added	103.7	0.0
Thermal yield from oil gas—B.t.u. per gallon	69500	69200
Illuminants—cu. ft. per gallon	13.8	12.2
Methane—cu. ft. per gallon	32.5	31.2
Ethane—cu. ft. per gallon	0.9	1.3
Carbon in oil gas—mols per gallon	.190	.179
Lbs. steam per gal. oil	6.6	6.1
Steam decomposition—per cent	14	46

* The results given in this table are not directly comparable with those set forth in the curves due to a change in the amount of refractory surface used.
** Free cross section area = .00181 sq. ft.
Volume of free space = .00212 cu. ft.
*** All gas yields are expressed as cubic feet of dry gas at 60° F. and 29.92 inches of mercury.



the laboratory experiments the illuminants were found to be predominantly olefinic in character as shown by the hydrogen-carbon ratios which are summarized in Table III. Under identical conditions, the variations in these ratios amounted to about 5 per cent. The decrease with increasing temperature is, of course, to be expected. The explanation for the slightly lower hydrogen-carbon ratios noted in the catalyzed experiments over the entire temperature range is not clear.

The minimum heating value for the illuminants was noted at about 1500°F. (816°C.), the carbon and hydrogen content per unit volume decreasing as the temperature was raised from 1300°F. (704°C.) to 1500°F. (816°C.). The formation of additional aromatics may be responsible for the rise in this content from 1500°F. (816°C.) to 1600°F. (871°C.).

Although the differences in the composition and heating value of the illuminants between the catalyzed and uncatalyzed experiments were very small at the lower temperatures, a marked difference was observed at 1600° F. (871°C.).

It is evident that the net variation in the experimental conditions produced by the catalyst, if not the catalyst directly, gave illuminants of a higher calorific value.

The Production of Sulfur Compound. — Decomposed in the uncatalyzed experiments, the oil gave an increasing amount of hydrogen sulfide with increasing temperatures. When the refractory surfaces were impregnated with soda, a marked decrease in the quantity of hydrogen sulfide resulted, and this quantity decreased with increasing temperatures. The observations are shown in Figure 5.

Since the alkali carbonate would be expected to decrease the production of hydrogen sulfide somewhat, an experiment was designed using refractory blocks which were impregnated with sodium sulfide. A comparison of the results thus obtained with those obtained in an analogous experiment in which sodium carbonate was used is shown in Table IV. These data suggest that refractories impregnated with the sulfide are just as active as those impregnated with the carbonate under the conditions encountered.

To determine whether this might be explained by a conversion of the sulfide to the carbonate under the conditions of the experiment, the refractory blocks from the sulfide were leached with water for about forty-eight hours. The filtered extract was very dark green, suggesting the presence of colloidal ferrous sulfide, and considerable iron was found to be present. Iron was also found in the water extract obtained from refractories initially impregnated with sodium carbonate. The colloidal ferrous sulfide may have originated from the iron in the cracking tube or in the refractory or both.

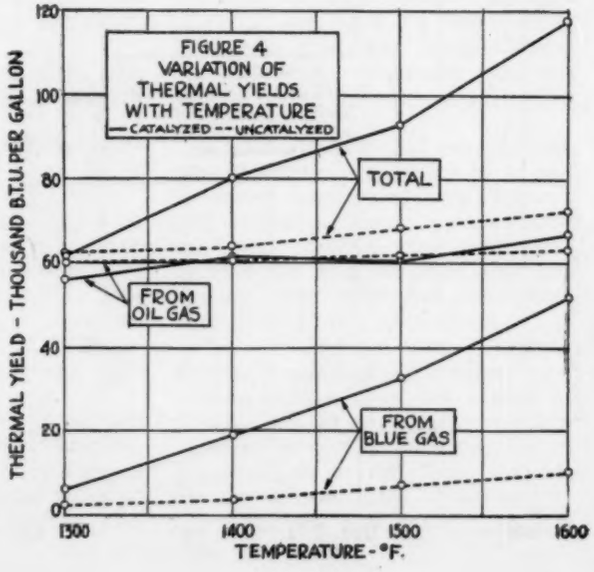
Brief consideration of the equilibria involved will indicate that the conditions set up are very complex, and that until further information is available, conclusions concerning the conversion and distribution of the sulfur and its effect upon the catalytic process should be somewhat tentative.

For such further studies, one desirable preliminary simplification would be the elimination of sulfide-forming metals other than the catalyst from the reaction system. When the experiments involve the presence of iron, however, it may be said that the alkali exerts a very appreciable influence on the production of hydrogen sulfide.

In some of the experiments, the organic sulfur concentration of the gas was determined, and it was noted that the organic sulfur formed appeared to vary with the amount of carbon deposited in the pyrolysis. Because of the disturbing influence of the iron, such observations are only tentative and should be further investigated. It has, however, been found in the industry that the organic sulfur formation can be decreased by maintaining low carbon conditions on

Table III
VARIATION IN THE COMPOSITION OF THE ILLUMINANTS WITH TEMPERATURE

	No catalyst present			Sodium carbonate present		
Temperature °F.	Comp.	H / C	Heating value B.t.u./cu. ft. at 60° F. and 29.92 in. Hg	Comp.	H / C	Heating value B.t.u./cu. ft. at 60° F. and 29.92 in. Hg
1300	$C_{2.7}H_{5.6}$	2.07	2159	$C_{2.7}H_{5.4}$	2.00	2120
1400	$C_{2.4}H_{5.0}$	2.08	1934	$C_{2.6}H_{4.8}$	1.84	1900
1500	$C_{2.3}H_{4.4}$	1.91	1799	$C_{2.4}H_{4.3}$	1.79	1851
1600	$C_{2.6}H_{5.1}$	1.96	2021	$C_{2.6}H_{5.3}$	1.77	2253



the refractories[5, 39] and this decrease can be explained by the carbon-sulfur complex theory[6].

duction of illuminants which were predominantly olefinic in character, and of a higher calorific value; and

Table IV

COMPARISON OF RESULTS OBTAINED WITH SODIUM CARBONATE AND SODIUM SULFIDE IMPREGNATED REFRACTORIES*

Experimental Conditions	Uncatalyzed	Na_2CO_3 Catalyst	Na_2S Catalyst
Temperature—°F.	1600	1600	1600
Mass velocity of steam**—lbs. per sq. ft. of free cross section per hr.	7.2	9.7	11.7
Mass velocity of oil**—lbs. per sq. ft. of free cross section per hr.	12.8	12.4	13.7
Total carbon in gas—mols per gallon	0.180	0.312	0.309
Total gas—cu. ft. per gallon	85.7	184.7	189.2
Blue gas—cu. ft. per gallon	18.2	109.3	120.1
Oil gas—cu. ft. per gallon	66.1	73.3	66.1
Total thermal yield—B.t.u. per gallon	70100	101800	99800
Thermal yield from blue gas—B.t.u. per gallon	5300	32600	35100
Thermal yield from oil gas—B.t.u. per gallon	64800	69200	64700
Lbs. steam per gal. oil	4.4	6.1	6.7
Steam decomposition—per cent	11	46	46
Hydrogen sulfide produced—grains per gallon	343	148	170

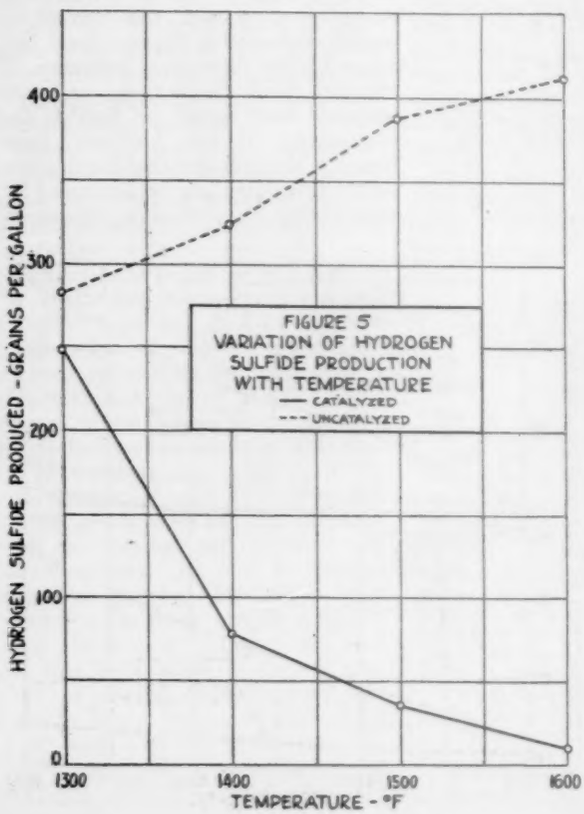
* The results given in this table are not directly comparable with those set forth in the curves due to a change in the amount of refractory surface used.

** Free cross section area = .00181 sq. ft.
Volume of free space = .00212 cu. ft.

When the refractory was impregnated with soda, at the higher temperatures of water gas carburetion, the experiments showed (a) a pronounced increase in the gasification of the oil carbon and a corresponding decrease in carbonaceous deposits; (b) a decrease in the heating value of the gas per unit volume; (c) decided increases in the total thermal yield; (d) no marked primary effect upon the pyrolytic reaction; (e) the production of illuminants which were predominantly olefinic in character, and of a higher calorific value; and (f) a decreased production of gaseous sulfur compounds, the last possibly because of an increased secondary reaction with the iron present. An experiment using sodium sulfide showed that this gave good catalytic activity under the conditions studied.

These results are definitely encouraging and suggest a number of interesting phases for further study in relation to water gas manufacture.

It must be noted, however, that for routine commercial work in both producer gas and water gas making sodium compounds possess a disadvantage because of the marked volatility of this metal at the reaction temperatures. Another resides in the marked slagging effect of the alkaline compounds upon the firebrick refractories ordinarily employed. While the latter may perhaps be overcome by the proper choice of an alkaline refractory, the loss of sodium due to the first suggests that the industry's attention might well be directed in the present state of our knowledge, at least, to such matters as the presence of naturally occuring alkali bases in oils and coals.



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Reminiscences

(Continued from page 13)

spector of construction, for the Newark, N. J., Gas Light Co., of a carburetted water gas plant of the Wilkinson generator-retort type. When the construction was completed, I was given the position of General Superintendent of the company in charge of manufacture and distribution and thus obtained experience with that type of apparatus.

As long as high gravity naphtha could be bought at a price of from three to five cents per gallon, the Wilkinson apparatus could be operated economically, although the total use of fuel in the generator and for heating the retorts was larger than that of generator fuel alone in the Lowe type. But, although one or two of the Wilkinson plants were operated with gas oil for a time, plants of this type were gradually replaced by plants of the Lowe type when the increased price of naphtha precluded its use for making gas.

This early practice with comparatively small sets, having hand operated valves, working on long cycles with low blast pressures and high grade materials and laborious hand clinkering seems crude when compared with the larger sets of the present day, automatically fueled, controlled and clinkered and able to use as fuel bituminous coal and as enriching material almost any grade of fuel oil. But the early operators did their best and their work helped to develop the art of carburetted water gas manufacture to its present status.

(To be continued)

Natural Gas Househeating Load Building

Trial Installation of Conversion Burners with Guaranteed Operating Cost Helped Considerably in Securing Many Customers in Saginaw and Bay City

By H. C. HAROLDSON

Industrial Gas Engineer, The Commonwealth and Southern Corporation

IN August of 1933, the Bay City Division of the Consumers Power Company began to serve its customers with 1,100 B.t.u. natural gas from the Michigan field. The following month, straight natural gas was turned into the mains in Saginaw.

A total population of about 167,000 is supplied with gas by these two divisions and at the end of June 1933, there were 25,633 meters in active use, of which 24,206 were domestic meters.

Previous to the advent of the natural gas, Bay City was served with 540 B.t.u. artificial gas and Saginaw with 570 B.t.u. artificial gas.

When the calorific value of the gas supplied is doubled, the sendout practically is cut in half. When natural gas is brought in, customers expect their bills to be reduced, so rate revisions are made, and unless the load can be built up quickly, the gas company is going to suffer a considerable reduction in revenue.

In artificial gas towns the sale to domestic customers is usually the most substantial portion of the business. Doubling the calorific value of the gas means that the capacity of the mains supplving the domestic customers is double. But, can one expect that the domestic customers will use a great deal more heat for cooking their food and heating their water just because they get natural gas instead of artificial gas?

It is difficult to arrive at a proper answer to this question by examining gas sales reports of the older natural gas towns and comparing their domestic sales with those reported by artificial gas towns.

In order to get an answer to this question, a very careful comparison was made in Peoria, Illinois. Natural gas supplanted artificial gas there in April of 1932. After six months with natural gas, they went through their ledgers, took off every tenth customer, made an analysis of the accounts, converting all gas to therms. In all, 2,215 accounts were covered from May to October, inclusive, for 1930, and for the same six-month periods in 1931 and 1932.

Important Data

With artificial gas in 1930, the average use per customer was 81.18 therms.

With artificial gas in 1931, the average use per customer was 81.23 therms.

With natural gas in 1932, the average use per customer was 84.14 therms.

The indicated increased use with natural gas amounted to only 3.6% so far as domestic customers were concerned. There is something definite, and obviously there does not seem to be much chance of recapturing lost revenue through that channel.

It, therefore, appears that the best means of recovering lost revenue, when a changeover to natural gas is made, is through increased sales to industrial and space heating customers.

The opportunity for securing any great amount of industrial business being limited, particularly in Bay City, the management decided early in June of 1933 that a vigorous activity should be inaugurated to obtain space heating business in the Bay City and Saginaw Divisions.

The following space heating rate had been agreed upon:

First 300 cu. ft. or less—$.75 net
Next 1700 cu. ft.—$1.50 net per M
Next 2000 cu. ft.— 1.00 net per M
Over 4000 cu. ft.— .60 net per M

Application of this rate makes the cost of the gas for space heating about 63½c per M cu. ft. The cost of heating with gas would then be equivalent to No. 2 oil at about 6.9c per gallon and coke at about $12.00 per ton. In view of the fact that most of our prospects were using coke at $7.50 per ton, it was realized that prospective customers were not exactly going to take gas heating away from us.

It was realized that considerable sales resistance was going to be encountered because of unwillingness and inability of the customers to buy the space heating appliances; and because the idea prevailed that gas heating was expensive compared with heating with other fuels.

To meet and overcome these obstacles, it was decided to install conversion burners at as low a price as possible and to offer the installation of these burners to a selected list of prospects on a trial basis for one heating season, with a guaranteed operating cost for that heating season.

Read before Meeting of Michigan Gas Assn., Grand Rapids, Mich., June 19-20, 1934.

All that was required of the customer was that his credit be good and that he agree to pay $2.00 per month as evidence of good faith and to partially reimburse the Company for the cost of connecting up the burner. Of course, there was also the small matter of gas bills which the customer must agree to pay.

The unusual feature of this plan was that the gas bills were guaranteed. It was decided that there should be no boosting of estimates, but that heat losses on each house should be computed according to standard methods, and we would take chances on experiencing a normal winter.

Accordingly, salesmen were started out in July 1933. During the peak of the activity, in September and October, Bay City had 5 salesmen, and Saginaw had 9 salesmen, working on salary and commission. These men were not experienced heating men, but were chosen for their selling ability. They were trained to measure houses, compute heat losses and prepare estimates of costs by months. Experienced gas house heating engineers in each Division checked the estimates and the premises, examined the furnaces for convertibility to gas, and specified the required equipment.

Quota Exceeded

It was estimated that during the last half of 1933, the Bay City and Saginaw Divisions should obtain 800 new gas heating customers. They did better than that, they signed up 995, or 4.1% of their active domestic meters. The estimated gas consumption on these jobs was 262,569 M cu. ft. which should bring in a gross annual revenue to the Company of $166,800.00.

The Bay City Division obtained 413 of these jobs or 4.6% of their domestic meters and the Saginaw Division got 582 or 3.8% of their domestic meters.

The peak of the activity was in September and October, the two Divisions getting 357 jobs in September and 239 jobs in October. It got cold early and that slowed down the activity.

By the end of the year 18 jobs had been removed in the Bay City Division and 33 in Saginaw. That is about 5% of the gross, but they still had 944 jobs. The causes of removals were: death, removal from the city, loss of employment or inability to pay the bills. When it was found that a customer had "bitten off more than he could chew," the job was taken out without argument. Many were sold and resold repeatedly, this being necessary because of the extreme weather experienced during some months. It looked rather bad when November came along about 16.5% colder than normal. January gave a little respite, then February blossomed out 21.4% colder than normal. Such extreme conditions make it difficult to persuade some customers that the winter will probably end up very close to normal. As it was, the total degree days for the '33-'34 season was 7,350, or about 5% colder than normal.

Effect of Hard Winter

According to that, with perfect estimating, all of the customers should have exceeded their guaranteed estimates. As it was, about 25% of them exceeded the guarantee figures by varying amounts. Most of those running over were by very small percentages. Complete figures are not yet available, but indications are that overage will be alarming.

The past heating season was 17% colder than the average of the seven previous seasons and 20% colder than the 1932-33 season. It would have been pleasant to have gotten a "break" last winter, but at least the customers now know the worst and during the trial period were not penalized by the cold winter.

How many of their trial customers are they going to sell? We don't know as yet. The customers do not have to decide whether or not to buy before the beginning of next heating season. We hope that when another heating season stares them in the face, the largest percentage of them will be reluctant to sacrifice all the advantages of automatic gas heat and will come into the fold.

Despite the fact that the customers are not required to sign a purchase contract until next fall, 297 of them had already signed up by June 9th and more have signed since. 44 more jobs have been lost since the first of the year which makes the total loss about 9.5%. If they lose another 10%, they will still have the 800 jobs which it was estimated were needed. We believe they will do better than that.

This activity, in these small towns, may seem to pale into insignificance beside the performance in some of the midwestern metropolitan centers, but if comparison is made on a meter basis, and rates, climate and the competitive situation is taken into consideration, it will be found that the above described campaign will compare quite favorably with others about which you may have read.

Dogs: How to Approach and Handle Them

WHEN a dog bites a man it is really the man who causes the biting. Few dogs, like few human beings, go out of their way to cause trouble.

No two dogs are alike in disposition. Virtually all dogs will first announce the visitor's presence to their masters by barking. That, is of course, provided they are not taken by surprise. It is well not to approach a dog's domain too quietly. Few dogs will use their teeth unless startled by some sudden motion which they fail to understand and which they construe as a threat to themselves or to the safety of the person and property of their master.

Many dogs dislike being petted until they have made their own introductions. Before touching a dog, he should be given a chance to sniff the hand that may be offered. He places much reliance on the sound of the intruder's voice. If the tone is quiet, confident and friendly, the dog quickly decides that here is a person who is not going to do anything suddenly and who means no harm to either himself or those he guards. Naturally, too, a dog uses his eyes all the time, and is suspicious of objects he does not often see, such as unusually shaped bundles, or in the case of repair men or meter readers, tools or flashlights. If these are being swung in the hand, he may think they are intended to strike him with.

Always let a dog know you are approaching by not being too quiet.

Growls or barks are a challenge; accept them as such and show no alarm.

Sudden or unexpected moves are likely to be misunderstood by a dog.

Speak to strange dogs in a confident, friendly voice, not sharply, or scoldingly.

Always allow a dog to approach and let his nose aid him in forming his impressions.

A dog should not be touched unless you have met often enough to establish a friendship.

Make all your movements natural; do nothing that might frighten him.

A dog should be given the impression that your visit is perfectly proper.—*From an article by Frank P. Dole, celebrated dog fancier, to promote safety of employees of the Consolidated Gas and Affiliated Gas, Electric and Steam Companies.*

ELEMENTS OF GAS TECHNOLOGY

Carburetted Water Gas

BEFORE leaving the subject of carburetted water gas, it will be of interest to mention a few of the modifications which have been introduced in recent years in the making of such gas. One of the most important of these is the Chrisman Down-run Process, which was first described in a report of the Water Gas Committee of the American Gas Association for 1925.

In the Chrisman Cycle, the gas made on the down run is taken from the bottom of the generator direct to the wash box, and in this, it is similar to a corresponding part of the reversed air blast cycle. The gas thus made leaves the generator at a somewhat lower temperature than either the up-run or blow gases, and furthermore, this temperature is below that required for proper and efficient oil results in the carburetor. As these relatively cool gases go direct to the wash box and not through the carburetor and superheater, there is no cooling of the checkerbrick in these parts of the gas-making apparatus, consequently less generator fuel is required to maintain the checkerbrick at the proper temperature to decompose the enrichment oil. The enrichment oil is, naturally, admitted during the up-run only. For the reason that less heat must be absorbed by the carburetor and superheater during the blow, it is possible to shorten this part of the cycle considerably, which of course increases the capacity of the set by permitting a greater number of runs per hour to be made. It is claimed, and observation has shown, that actual fuel savings of 2 to 3 lb. of generator fuel per 1000 cu. ft. of gas produced, are obtainable with this system of operation.

The "reverse air blast process," described by Howard in the *A. G. A. Monthly*, October, 1925, is another process devised for increasing the efficiency of water gas sets using bituminous coal as a fuel. As might be expected from the name, during a part of the blow the direction of the air is reversed so that it passes down through the fire. The reverse blast really replaces the blow-run in the ordinary cycle. Air is admitted into the top of the superheater, passes from thence up through the carburetor, and finally is forced down through the fuel bed. The blast gas made in this part of the cycle goes direct to the wash box or scrubber, as in the Chrisman cycle. During the down-run, the blue gas also passes direct to the scrubber through the same pipe. This pipe is known as the "bypass pipe."

When the reversed blast cycle is used, the time of the up-blow is so short that the lower part of the fuel bed is kept considerably below the temperatures obtained with the ordinary methods. During the reversed blast, combustion takes place mainly in the upper, cooler portion of the fuel bed, and the reduction of the CO_2 thus formed takes place lower down in the fuel bed, absorbing heat as the reduction to CO is accomplished. The net effect of all this is a lower maximum temperature, a higher average temperature, and a more uniform distribution of heat. The entire cycle is (1) up blast; (2) reversed blast; (3) up-run, all the oil being admitted at this time; (4) down-run; (5) up-run; and (6) air purge.

The advantages claimed for this process are increased capacity, less generator fuel required, somewhat less gas oil required, increased life for the checkerbrick, and finally, a much softer, more brittle clinker which is easily removed. There is no necessity for a hot valve, as its place is taken by two reversing valves in the wash box.

The disadvantages are few, and seem to be mainly in the larger number of valves and fittings required, and in the fact that there is a slow corrosion of the pipes and valves through which the reverse blast gases are passed.

It is self-evident that in all processes for the manufacture of carburetted water gas, as the name implies, a carburetor and enriching oils are necessary. The probability, now somewhat remote, that the price of the enriching oils would advance materially has led to a great deal of experimentation on the production of methane from blue gas, and several schemes have been devised to accomplish this. Practically all of these methods depend on catalysts to produce the desired result, metallic nickel being the catalyst generally employed. It is placed on a porous support and the hot blue gas passes through it, with the following principal reactions taking place:

1.—$CO + 3H_2 = CH_4 + H_2O + 107{,}700$ B.t.u.
2.—$2CO + 2H_2 = CH_4 + CO_2 + 107{,}000$ B.t.u.
3.—$CO_2 + 4H_2 = CH_4 + 2H_2O + 108{,}400$ B.t.u.

The most desirable of these reactions would naturally be 1 and 3, as the water formed would condense, and enrichment would be improved. However, when blue gas of normal composition is thus treated, reaction 2 predominates, and moreover, the equilibrium for all of these reactions is much better at low temperatures than high temperatures. At low temperatures, the rate of change is hardly measurable, and at the higher temperatures necessary for commercial practice, there is still another reaction due to the catalyst, as follows:

$$2CO = CO_2 + C.$$

This causes a deposit of carbon on the catalyst and soon destroys its activity. For these reasons, it is necessary that the reactions must take place within a very narrow range of temperatures, in the neighborhood of 620° F., and very close control must be maintained.

The reactions being exothermic, at low temperatures, it is not usually practical to try and recover any of the heat evolved. The enrichment, therefore, involves the loss of about 20 per cent of the heating value of the gas converted to methane, which is somewhat paradoxical. The nickel catalyst is very susceptible to poisoning, especially with organic sulphur compounds, and this naturally raises serious objections in commercial practice. There is scarcely any possibility that this process would be commercially successful, so long as the price of gas oil does not increase to several times its present price.

As has already been stated in a previous installment, the manufacture of many chemicals is possible using blue gas as the raw material. Among the chemical products manufactured may be mentioned methanol and a whole series of alcohols, various solvents for lacquers, varnishes, etc., acetone, various substitutes for gasoline, and a host of others.

Oil Gas

THE "cracking" of petroleum oils produces oil-gas, which is very similar to coal gas in average composition. Oil gas is essentially the same gas used for the enrichment of carburetted water gas, and considerable quantities of it are produced and used in localities where oil is cheap and solid fuel is expensive. California has been the pioneer in the manufacture of this type of gas.

There are two principal processes in use at present, known as the Jones process and the Dayton process, which differ radically from each other. The Jones process utilizes a series of checkerbrick generators, through which a mixture of oil and steam is blown. The checkerbrick previous to the run, is heated by the

combustion of an air-oil spray. In the Dayton process, the heat necessary for the formation of the oil-gas is generated by the burning of a part of the oil inside of a gas-making retort. Both of these processes will be described in more detail later.

The main use of oil gas is domestic heating and cooking, although it is employed to a limited extent for industrial purposes as well. It is also useful for standby service to meet peak loads, as it can be made quickly and easily.

As might be expected, oil gas has many advantages to recommend it. Plants can be built in such large units that labor charges are greatly reduced; no clinker is formed and there are no ash removal problems; gas of almost any desired heating value can be produced at will; it has a lower specific gravity than water gas, and more of it can be handled through the same distributing system; and finally, it can be produced almost continuously, so that smaller holders can be used.

However, there are corresponding disadvantages when oil gas is used to replace other city gas. It requires a different air-shutter adjustment on domestic burners, which is an expensive change to make, and besides, the rate of flame propagation, particularly with the Dayton process gas, is so low due to the high percentage of hydrocarbons that there is great danger of the flames blowing out of burners suitable for water gas. This is due to the fact that the gas velocity through the ports might be greater than the speed of the flame propagation.

The composition of oil-gas varies considerably with the method of manufacture.

Gas made by the Jones process contains very little nitrogen, as no air is admitted during the run, and it is relatively rich in hydrogen, resulting from the action of steam on the carbon deposited during the blow. Dayton process gas has a low hydrogen content, and besides, contains all of the nitrogen from the air used to partially burn the oil. Different types of oil used also affect the composition materially. Typical analyses of Jones process gas and Dayton process gas are shown in the following tables, taken from Haslam and Russell, *Fuels and their Combustion*, page 639.

	Jones Process		Dayton Process
Constituents	San Jose, California Per cent	Gas from heavy California Crude Per cent	Average Analysis Per cent
CO_2	2.8	2.6	6.1
Unsat. Hydrocarbons.	..	..	14.7
C_nH_{2n}	2.7	7.0	...
CO	10.6	9.2	5.6
Saturated Hydrocarbons	..	..	7.8
CH_4	27.0	34.6	...
O_2	0.1	0.0	0.9
H_2	53.5	39.8	1.7
N_2	3.3	6.8	63.2
B.t.u. per cu. ft.	535.	680.	450.
Specific gravity	0.391	0.482	1.02

In the Jones process, large quantities of lampblack are produced, amounting to about 20 lbs. per 1000 cu ft. of gas manufactured. This, however, does not represent a direct loss. The lampblack is recovered, dried and mixed with other fuel for burning under boilers. In some cases, it is briquetted.

The Jones Process

The Jones oil-gas set consists essentially of two generators, a primary and a secondary, arranged in the form of a U, with the primary generator somewhat shorter than the secondary; a wash box, and a scrubber. The function of the wash box is similar to that in a water-gas set. Both generators are lined with fire brick, and are divided into various chambers partly filled with fire brick supported by arches.

The heating oil is burned in the first chamber at the top of the primary generator. Beneath this, and below the arches supporting the checkerbrick in the first chamber, is the primary make chamber, into which the primary make oil is sprayed. The checkerbrick in this primary make chamber extends all the way into the bottom of the secondary generator.

Between the base of the primary combustion chamber and the primary make chamber are two additional chambers, one used as a secondary make chamber (inside the primary) and one used for the admission of steam.

The secondary generator contains the stack value, a steam chamber and an oil-spray chamber. The gas take-off pipe is located part way up the secondary generator at a point on a level with the top brick of the primary make checkers, and is fitted with large doors for cleaning out the lampblack. The gas take-off leads into the wash box which is kept constantly supplied with running water. The water circulates through a continuous filter which removes the lampblack.

The cycle of the Jones process is usually about 20 minutes. First, there is a one-minute primary air blast with the stack valve open. This purges the machine, burns carbon deposits in the primary generator and aids in raising the heat for the next run. Next, there is a one-minute secondary air blast with reduced primary blast, with the stack valve still open. This is to burn out carbon deposits in the secondary generator. The third step is a heating period of eight minutes, with primary blast, and stack valve open. This uses 4 to 6 gallons of heating oil per minute. Finally, there is a ten minute gas making run, with the stack valve closed.

At the end of the heating period, just before the real gas make starts, the blast and the heating oil are shut off, the stack valve closed, and steam is admitted at the top of the primary generator at the rate of about 35-40 lbs. per minute. Steam is also admitted at this time at the top of the secondary, at about half this rate. The purpose of the steam is to react with the carbon deposited during the heating period.

About 1½ minutes after the stack is closed, the primary make oil and the secondary make oil are admitted, at rates of 25-30 gal. and 15-20 gal. per minute respectively. Oil is admitted for a total of 6½ to 7½ minutes, after which the oil valves are closed and the steam left on for 2 or 3 minutes to purge gas out of the generators and to reduce carbon. This completes the cycle.

Employee Education

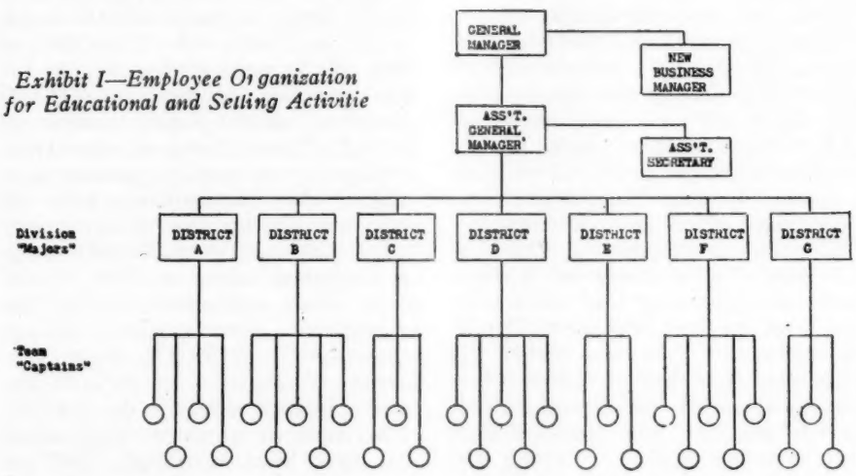
Increased Sales and Betterment of Good-Will and Public Relations Were the Result of Intensive Schooling of the Employees of the Author's Company

By S. B. SEVERSON

Vice-President, Dominion Natural Gas Co., Ltd., and Associated Companies

IT is the purpose of this article to trace the development of employee education and participation in one particular group of utility properties, to point out the plans and organization which have been tried, and the benefits which have accrued to both the company and the employees. These utilities, called the Dominion-Republic Group of Cities Service Company subsidiaries, consist of The Dominion Natural Gas Co., Ltd., The Southern Ontario Gas Co., Ltd., and associated companies. These particular companies distribute gas—natural, manufactured and mixed—to 79 communities throughout the southern part of Ontario, Canada, and western New York and serve over 85,000 customers. As a result of this widespread activities these companies serve a varied type of localities, from city distribution plants of 10,000 or more meters to smaller villages and rural communities. Thus it was necessary from the start to plan a type of organization which would be flexible enough to meet the many varied conditions and problems as they were presented.

Exhibit I—Employee Organization for Educational and Selling Activitie



There are in every organization certain employees who are alert to take advantage of every educational opportunity offered and who are ambitious enough to better themselves and equip themselves for better jobs. In order to encourage these employees, the management of this particular group offered to assist in paying a portion, usually one-half, of the cost of educational courses upon their satisfactory completion. Thus, these employees have taken courses at nearby universities, schools and some of the fine correspondence courses offered by such organizations as the American Gas Association. Also at various times many of the employee groups have studied some of the customer relations courses offered by this same organization. The benefits of this work were soon apparent, as these employees fitted themselves for better jobs, or better understanding of their own jobs, and naturally were able to initiate many economies.

It was soon felt that an opportunity for participation in sales activities should be given to all employees, and a plan, later to become known as the Employee Tip Selling and Bonus Plan, was organized. As the success of any plan usually depends upon a carefully planned organization, it was only after past experience had proved it successful that the present type of organization was adopted.

Line-up of Personnel

The entire group of properties was divided into eight districts, each under the local Division Superintendent, known as a "Major." It was his designated responsibility to take charge and encourage employee participation in these activities. Under him were responsible employees, designated as "Captains," in charge of teams to which the remaining employees were assigned. Past experience has shown that wherever possible these teams should be in small units, preferably ten in number or less, in order to afford the necessary competitive stimulus and to meet the varying units of shop, field and office. The General Manager of the group was directly in charge of all this work, and had several assistants to carry out the details necessary to its success and to coordinate through the General New Business Manager the activities of the salesmen with the employees. A diagrammatic chart of the organization is shown under Exhibit 1, and because of its flexibility and adapta-

Portion of a paper read before 27th Annual Convention, Canadian Gas Assn., Montreal, June 4-5, 1934.

bility to any type of employee activity, it is one well worthy of consideration by an organization seeking to embark upon these activities. Because of its small units, under the direct supervision of responsible employees, encouragement to the individual employees can be given, a "team" spirit in the competitive sense can be developed and the entire set-up can be utilized for any type of activity. This organization also encourages the individual employee to make as good a showing as possible, because the outstanding employees, in whatever activity engaged, can be easily and readily recognized and awarded.

Bonus for "Tips"

Very early, The Dominion Natural Gas Company, Ltd., early endorsers of Employee Co-operation, started a cash bonus plan for appliance sales resulting from "tips" given by employees. The purpose of this plan was to tap the reservoir of the numerous contacts which employees had through relatives, friends and customers, and to encourage them to turn over to the Sales Department "leads" which would result in the sale of gas-burning appliances. It made the employee alert to present conditions and promoted a sales consciousness which was beneficial to the company and to the employee. It enabled him to earn additional money through the bonuses paid on the sales resulting from tips and at the same time furnished the Sales Department with "warm" or "hot" prospects rather than "cold" ones, thereby making more productive the calls of the sales representatives, and the company benefited by increased sales and revenues.

This type of employee cooperation through the furnishing of "tips" was utilized at once in a special Automatic Hot Water Storage System Campaign. During a 54 working day period, 709 storage systems were sold, and 164 new customers added to the lines. As this campaign was featured at a time when business conditions were conceded to be at a low ebb, the results proved conclusively that attractive sales volume could be obtained with employee cooperation. In connection with this activity a booklet was issued to all employees outlining the Tip Selling and Bonus Plan, furnishing prospect cards and other valuable information. At the same time, as an added stimulus, educational meetings were held with all employees and a special weekly campaign paper published the results of the sale, standing of the districts and other notable achievements.

Exhibit II.

EMPLOYEE-CUSTOMER RELATIONS COURSE

Dominion-Republic Group

Note:—This course is based on five lectures to the unit, given every other week during May and June, September and October. It is anticipated that 1½ hours will be given to each meeting. Course is flexible enough to work in sales lectures, accident prevention talks, customer contact discussions as well as any other type of interest.

	FIRST LECTURE	SECOND LECTURE	THIRD LECTURE	FOURTH LECTURE	FIFTH LECTURE
GENERAL SECTION	Sales Lecture Building of Warehouse to	Introduction to Course Characteristics of Public Utility Industry	History of Natural Gas History of Manufactured Gas	Accidents Prevention of Reporting of	Tour of New York State Properties Natural Gas Division
SPECIFIC SECTION	Analyze Product for campaign Write Selling Talks Utilize Principles Learned	Introduction Meter Applications Security Deposits	Turn-ons	On Gas Leakage Automobiles	Meter Reading Billing
DISCUSSION PERIOD	In Salesmanship Course	Employees are encouraged to discuss above subjects, relate experiences, air complaints and secure help in solving their problems. Emphasis is also laid on functional relation ship existing between each employee's job.			

The results of this initial step into employee participation were so successful that finally a permanent Employee Tip Selling and Bonus Plan was organized on a team basis. In order that everyone might become familiar with the details of the plan a booklet entitled "Employee Bonus Plan" was given to each employee. This booklet contained the outline of the plan, the schedule of bonuses paid on appliances sold from tips and also twelve "Prospect Cards" in duplicate. On these cards the employee furnished detailed information as to the name and address of the prospect, and also the kind and type of appliance which the prospect was interested in. The original card when filled out was turned over to the Sales Department and the duplicate copy kept by the employee. The date of filing of the card was noted and all such cards were good for a sixty-day period. If the employee desired to refile the card at the end of the period, it was necessary for him to make another personal call upon his prospect. If the Sales Department closed the sale, the employee received his bonus the first of the following month. If the sale was not closed, the card was returned to the employee with an explanation noted on it. In addition, bonuses and prizes were awarded the leading captain in each district for the quarter and a prize was given to the outstanding major and captain in the American and Canadian Division for the year.

The results of this employee activity was very gratifying, and produced during a year $110,000 worth of gas appliances sales from tips, or 38% of the total appliance sales for the year, in addition to $15,000 worth of sales by direct employee selling. These combined sales from employee participation amounted to 43% of the total appliance sales for the year. During the following year "tips" produced over $67,000 worth of appliance sales, or 28% of the total, which, combined with $42,000 of employee direct appliance selling, amounted to $109,000 from employee participation, or 46% of the total appliance sales for the year.

An analysis of these "tips" show that they have furnished "hot" or "warm" prospects rather than "cold" ones for the salesmen and have resulted in sales. In one district since June of last year, 39 appliances were sold on 138 appliance tips, or 28% productive. Likewise, 32 new or dead services were connected from 61 service tips, or 53% productive. In another district a sale has resulted from every four tips turned in. Thus "tip" selling is a decided improvement over cold canvassing and shows the productive possibilities of this type of employee cooperation.

There is another phase to employee Tip and Direct Selling which is very desirable. That is the fact that there is apt to be less returned appliances or "sales pulled" and also more sales for cash. There has as yet not been sufficient data to definitely establish that fact, but a study of the available data revealed that

the trend of the ratio of returned appliances or "pulled sales" appears to decrease in proportion to the employee sales. Finally "tip" selling assists in making the employee more salesminded toward the products and services of the organization.

The success of the Tip Selling and Bonus Plan naturally led to an encouragement for further employee participation in sales activities and resulted in the inauguration of an Employee Direct Selling Campaign. A Spring Radiantfire Campaign was conducted and its success was so gratifying that a second campaign was held in the fall of that year.

The organization for this selling campaign was on the same district and team basis previously mentioned and the radiantfire was chosen as the appliance to be sold because of its customer acceptance value and load building aspects. In two Employee Direct Selling Campaigns conducted in one year there were 1,673 radiantfires sold. The operating and accounting employees sold 1,139 heaters, or 68% of the total sales, and the New Business representative sold 534 radiantfires, or 32% of the total sales.

With the past success of this type of selling in mind and with the team tip selling organization continued, there was featured in the following year five campaigns in which employees participated directly. These campaigns were a Mid-Winter Storage System, a Spring Radiantfire Sale, a Mid-Summer Storage System, a Fall Radiantfire and a Holiday Range Sale.

As a result of these direct selling activities during the year a total of 908 Storage Systems, 1,620 Radiantfires and 451 ranges were sold during the campaign periods. The tabulation below shows the number of each unit sold and the number and percentage of employee and sales representative selling.

DOMINION-REPUBLIC GROUP

Employee and New Business Direct Selling Campaigns

	Storage Systems		Radiant Fires		Ranges	
	No.	%	No.	%	No.	%
Employees.	321	35.4	957	59.0	210	46.6
Sales Representatives	587	64.6	663	41.0	241	53.4
Total	908	100.0	1620	100.0	451	100.0

These results clearly showed that employee participation in sales work produced during a year beset with financial and economic difficulties a sales volume which was gratifying to the management. Besides the successful storage system and Radiantfire campaign, the sale of ranges by the employees was particularly noteworthy. This was the first time all employees were eligible to sell ranges, and the results tended to show that this appliance could also be sold by a salesminded organization. Of particular interest was the fact that this sale was conducted during December at a time when the manufacturers of gas ranges were skeptical about the sale of this appliance by employees.

Earning Additional Money

This type of employee participation was the next logical step, because it enabled the employee to earn additional money and make it possible to carry on selling activities in widely scattered districts and communities where it was prohibitive for a regular salesman to seek sales. These employees became more salesminded and learned the value and necessity for continually building up the gas load. They learned more about each new appliance and were able to educate their patrons as to the value of gas service. At the same time they gained confidence in meeting people and in selling appliances, ideas or service.

After the employees had proved their capability in both the Tip Selling Plan and in Direct Selling Campaigns it was felt that they would be better equipped to continue in the way of tips and commissions if they were thoroughly grounded in the art and science of salesmanship.

Accordingly, in the early spring of 1933, an arrangement was made with a nationally-known sales organization to train in an intensive course five picked men from the organization. These men in turn became instructors, and later conducted classes for all employees, passing on to them the information which they had acquired. These men were assigned districts first on the American side and later on the Canadian side, and held regular weekly classes in all of the districts. The course itself was very practical and had had considerable success in other organizations where it had been tried. It taught the employees the essentials of sound, common-sense salesmanship as practiced by experienced and successful salesmen all over the country and gave practical methods for creating interest on the part of prospects in ideas or products.

These lectures were given weekly, and each employee was furnished with a looseleaf notebook and mimeograph sheets outlining the principles of the course, sale, and talks and other pertinent data. The course lasted for twelve weeks, and in order to make a practical application of the methods being taught, was conducted at the same time that a Direct Selling Campaign was in progress. In this way the employees had a laboratory in which they could try out the methods they learned and practice talking the sales talks they prepared in class. Besides the value which this course gave in connection with the direct selling of appliances during campaigns, it also gave the employees a further tool with which to meet and adjust customers' complaints, dissatisfactions and other matters. This factor has been used since in connection with a Customer-Relations Course. The Salesmanship Course was successful from the start and was not only enjoyed by all participating, but also was the means of giving direct benefits to all employees. In addition, the results from this course were very gratifying, for it was found that employees who had previously sold were able to increase their number of sales, and many employees who had previously been non-productive as far as sales were concerned had become successful sellers.

Employees Trained

It was found advantageous to have men from within the organization trained for this work rather than have an outside agency, due to the expense involved and also that once this group was trained it could be utilized in all future employee education. It was thus possible to utilize men familiar with the organization and its policies, known to its employees, and as a result a better spirit of co-operation in carrying out this work was obtained.

A further participation by employees took the form of an Employee Canvass. For a long time it had been felt that a thorough canvass of the properties would be a very worth-while task, and accordingly under the same team organization used in previous employee activities this canvass was carried on. Under the supervision of the "Majors" each team captain was responsible for canvassing a certain street or streets, and with his team members carried out this work. Each employee was asked to make five canvass calls a week, and thus by this systematic means the properties were canvassed. Cards were filled out by the employees listing pertinent data as to name, address, type of utility service, appliances on lines, etc. This, too, was carried on during the Direct Selling Campaigns and proved a valuable means of securing "tips" for sales or "leads" for future sales. In addition, these canvass cards, when filed and cata-

logued, gave the management a great deal of information as to customers served, appliances on the lines for pressure surveys and existing dead services. All this data proved to be a valuable means of arriving at future policies of sales activities. This activity was also utilized by some of the "Majors" during slack periods of work and at the same time enabled the employees to adjust many complaints, explain rates and other matters, which all helped to promote and retain good customer relations.

Upon the completion of the intensive Salesmanship Course it was felt by the management that the principles learned during the work and their application to the employee's daily contacts with the customers were too valuable to be neglected. At the same time it was felt that additional information should be given to the employees in order to give them a working background in answering the customers' questions or complaints.

Employee-Customer's Relations

Accordingly a course in Employee-Customer's Relations was planned which furnished this need. The purpose of the course was to give the employees a background of the utility and gas business in general with its peculiar problems and covered such general subjects as the nature of the public utility and gas industry, its problems in connection with rates, regulation, franchises and the organization and operation of the natural and manufactured gas industry. Under a specific section, company policies on matters directly affecting customer contacts and the reasons for them were taken up. Finally a discussion period was held, during which the course leader encouraged participation by the employees on the subjects covered and attempted to assist them in thrashing out their peculiar problems. Continually throughout the course the principles of salesmanship learned under the Salesmanship Course as applied in meeting customers, selling services and handling complaints was stressed.

At the same time as each customer contact was discussed the functional relationship which each employee bore to it was pointed out and stressed in order that each one would be more appreciative of the other employees' problems. This has helped in smoothing out points of friction which can easily arise between different groups, whether office, operating or salesmen.

Under Exhibit III a brief outline of one of the units of this course is given to show how the course is planned so as to be practical enough to impart the actual information which the employee needs; interesting enough to hold his attention; comprehensive enough to cover all phases of customer relations; flexible enough to meet specified circumstances, such as Direct Selling Campaigns and rate agitations; and planned and prepared so that the entire work may be carried out systematically and with thought so that all its objectives will be met.

At the time the first unit of the course was being given the Holiday Range Employee Direct Selling Campaign was in progress, so that it will be noted that the third lecture covered this subject by permitting a sales talk at which the appliances were analyzed, and sales talks prepared. This assisted the employee in his selling and, being held during campaign time, stimulated the selling activities.

Shortly afterwards, with the approach of the winter months, it was felt by the management that the matter of Accidents—Their Prevention and Reporting—was of vital importance, so it was very easy to work into this flexible course a lecture on this important phase of utility operations.

This course is given by the instructors previously mentioned to all employees every other week during May and June, September and October. It has been found to be very useful in promoting better customer relations, discussing company and employee problems and focusing attention on the vital importance of the daily contact with customers.

As this group of properties entered 1934, a schedule of all activities in which employees had participated was drawn up in order to show the relationships existing between them and how they all dovetailed into a planned program for the year. An outline of this schedule is shown under Exhibit III, and is sufficiently graphic to depict the year's plan. Thus while Employee Tip Selling is going on continuously,

(Continued on page 32)

Exhibit III.

A PLANNED SALES AND EDUCATIONAL EMPLOYEE PROGRAM FOR SALES PROMOTION AND BETTER CUSTOMER RELATIONS DOMINION-REPUBLIC GROUP

Activity	Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
DIRECT SELLING	Space Heaters; Storage Systems; Space Heaters; Ranges
SALESMANSHIP	
CUSTOMER-RELATIONS	

Explanation of Schedule

DIRECT SELLING CAMPAIGNS	Carried on during specified campaign periods (see above). Selling open to all employees and organized on team and division basis. Commissions paid to all selling employees and special bonuses for successful sellers. Publicity and competitive stimulus given by campaign paper stressing sales, quotas, outstanding achievements, etc.
SALESMANSHIP COURSE	Intensive 12-week course given to all employees in 1933. During 1934 to be used in connection with **Customer's Relation Course** making application of selling principles to meeting and adjusting complaints, selling services, rates, etc. Also previous to each **Direct Selling Campaign,** to be used in analyzing product, building sales talks, etc.
CUSTOMER RELATIONS COURSE	Each unit consists of five lectures and discussions, one of which previous to **Direct Selling Campaigns** analyzes product, builds sales talks, etc. (see Exhibit II.) Purpose: to give employee background of utility and gas business, company policies on matters affecting customer, to meet and adjust complaints, sell services and show functional interrelationship of jobs of each employee.
TIP SELLING	Carried on continuously throughout the year on a quarterly basis with commissions paid to employees on sales resulting from tips. Tips awarded on $ value of net sales and quarterly bonus and prize to leading team captains; annual prize to leading American and Canadian team captain and major.
OTHER EDUCATIONAL ACTIVITIES	**Employee Canvass** — **Employee Suggestion Contest** **Recipe Contest** — **Dealer Co-operation** **School of Practice** — **Home Study Courses**

Building the Househeating Load

A Short Manual Which Will Enable This Class of Business To Be Obtained Expeditiously and Without Costly Errors

By CARL B. WYCKOFF

Househeating Department, The Public Service Company of Colorado, Denver, Colorado

IT is not the purpose of this treatise to outline any one person's ideas, but to compile those of many, which have proven successful, into a concrete form that will supply a sound basic structure upon which a permanent househeating load can be built and retained.

Having been on the firing line for over five years in the midst of one of the country's major activities along this line, it has been the writer's opportunity to view the situation as a whole. Realizing the importance of the househeating load to the gas industry, one feels the need of such a work as this to assist and guide those who find themselves confronted with the responsibility for this type of load building.

It is desired to cover the subject in such a manner as to form a complete guide and manual to help the interested ones in securing a good load expeditiously and without costly errors; also, to let the experience gained in the past be the most beneficial in solving the problems of the future.

Policies—The one in charge must have the whole-hearted cooperation of all concerned and the broadest of vision is necessary to insure success as it would be quite possible for any one person through over-zealousness of his own department's interests to hinder materially the undertaking.

It is assumed that gas of the proper quality and offered at a price that will attract househeating business is available. When natural gas or mixed gas replaces a gas of lower calorific value it naturally follows that there will have to be a corresponding increase in therm sales even to maintain the previous volume of Mcf sales. The gross revenue will shrink seriously while the expenses will not decrease in proportion. You will shut down the gas plant, but you have to buy your gas, and this margin will not compensate by any means for the reduction in gross receipts. Other than this, your overhead expenses will not differ. It will require the same organization and the investment and fixed charges certainly will not decrease. Thus it is imperative that a greatly increased load be secured as quickly as possible. To accomplish this an aggressive and well planned sales activity must be inaugurated without delay and the whole program approached with courage.

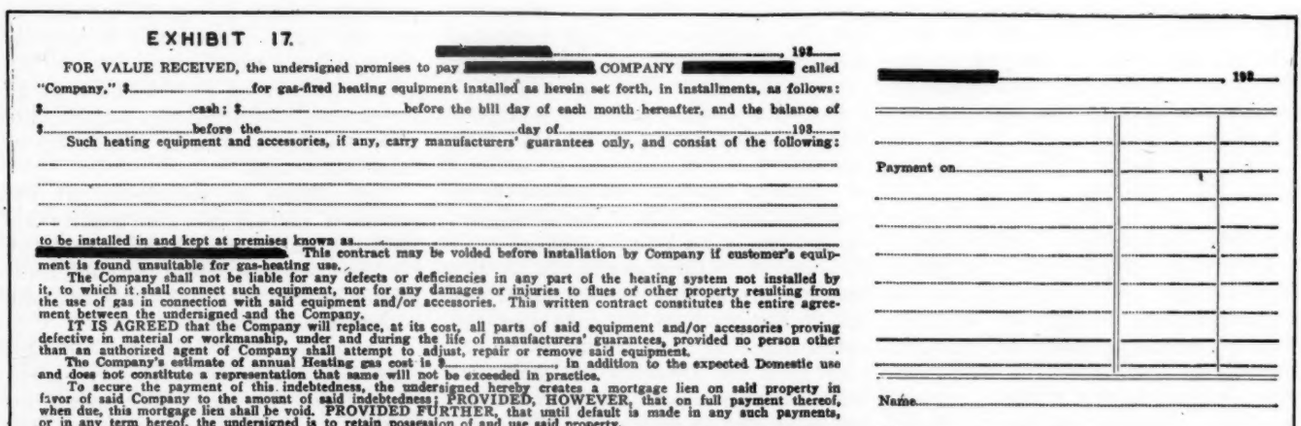


EXHIBIT 17.

[redacted], 193..

FOR VALUE RECEIVED, the undersigned promises to pay [redacted] COMPANY [redacted] called "Company," $.....for gas-fired heating equipment installed as herein set forth, in installments, as follows: $.....cash; $.....before the bill day of each month hereafter, and the balance of $.....before the.....day of.....193..

Such heating equipment and accessories, if any, carry manufacturers' guarantees only, and consist of the following:

.....

.....

.....

.....

to be installed in and kept at premises known as.....

[redacted] This contract may be voided before installation by Company if customer's equipment is found unsuitable for gas-heating use.

The Company shall not be liable for any defects or deficiencies in any part of the heating system not installed by it, to which it shall connect such equipment, nor for any damages or injuries to flues of other property resulting from the use of gas in connection with said equipment and/or accessories. This written contract constitutes the entire agreement between the undersigned and the Company.

IT IS AGREED that the Company will replace, at its cost, all parts of said equipment and/or accessories proving defective in material or workmanship, under and during the life of manufacturers' guarantees, provided no person other than an authorized agent of Company shall attempt to adjust, repair or remove said equipment.

The Company's estimate of annual Heating gas cost is $.....in addition to the expected Domestic use and does not constitute a representation that same will not be exceeded in practice.

To secure the payment of this indebtedness, the undersigned hereby creates a mortgage lien on said property in favor of said Company to the amount of said indebtedness; PROVIDED, HOWEVER, that on full payment thereof, when due, this mortgage lien shall be void. PROVIDED FURTHER, that until default is made in any such payments, or in any term hereof, the undersigned is to retain possession of and use said property.

In event of non-payment of any part of said indebtedness, when due, or of an attempt to remove any of the property from its present location, or to transfer, sell, or encumber it without written consent of Company, or in case any of such property shall be taken by legal process, or if Company should deem itself insecure, Company (its agents or assigns) may declare said indebtedness due, enter said premises, or elsewhere, wherever said property may be found, and remove and take possession of all thereof, without process of law, and sell the same at public or private sale, without notice, upon such terms, at such price, and to such party as Company may see fit, its right to become a purchaser at said sale being expressly granted. Proceeds of said sale, after paying all expenses thereof, shall be applied by Company upon said indebtedness, and then upon any other sum undersigned owes Company, paying over surplus, if any, to undersigned on demand.

.....(SEAL)

.....(SEAL)

[redacted], 193..

.....

Payment on.....

.....

.....

.....

.....

.....

.....

.....

Name.....

Address.....

Div.....Dist.....Folio.....

[redacted]

By.....

Lease or Contract Form

EXHIBIT 2.

Without
Type Heating.....with Thermo
Gas Equipment.....
Ceiling Insulation.....Date.....
.....Rooms .....Heated

Actual Bills

	1929-30	1930-31	1931-32
Sept.			
Total			

Dom. 12 times
Summer Average.....Av.....
Htg. Only 9 Mo.....Av.....

Salesman's Form for Recording a Representative Number of Jobs Installed and Costs

EXHIBIT 18

ESTIMATE AND ASSURANCE AGREEMENT

Assurance is hereby given_____

_____

_____

That the annual gas cost of heating the above premises with gas, excluding the cost of gas for other purposes, will not exceed by 15% the Company's estimate of $_____, using the following equipment:

It is agreed in connection with the purchase of the above mentioned Equipment, that
If, by _____193 , the househeating bills exceed the rate of this Estimate by more than 15%, and you desire the equipment removed, the Company will, upon written notice from you and at its sole expense, remove items _____ of the equipment, provided all bills and/or installments have been paid to date. The equipment so removed shall become the property of the Company.

For such equipment removed, the Company agrees to credit your account with the purchase price, in the amount of $_____.

Failure to receive written notice from you by_____ constitutes your acceptance of the above described equipment as satisfactory, and thereupon this agreement is terminated.

[redacted] COMPANY [redacted]
BLANK of BLANK

BY_____

ACCEPTED

_____

Assured Performance Contract To Be Used as a Last Resort to Close the Deal

Legal—The company's legal department should draw the contracts for the sale of househeating equipment so as to make them not objectionable to the prospective customer. I have in mind a form of contract I once saw that had CHATTEL MORTGAGE printed across it diagonally in box car letters. Such a contract would antagonize any one except the most callous dead-beat. It is true, of course, that the contract does constitute a chattel mortgage, but why emphasize it. Such statements, where necessary, can be embodied in the general contract form. The same consideration should be given to all other forms. It must be remembered that we are trying *to sell* to the customer—he is not trying *to buy* from us.

Credits—Merchandise terms must be as liberal as possible. A good househeating job frequently runs into considerable money and the payments should be as small as possible so as not to burden the customer beyond his limit to pay without inconvenience. These terms should vary from all cash to as much as five years, depending upon the amount of the sale and the ability of the customer to pay. These long terms are fully justified when it is considered that our business is different from the ordinary merchandising. We are selling the gas from the time the job is installed. The credit department should take this into consideration, together with the situation outlined under "Policies," wherein the need for increased revenue is emphasized. Where there is real dealer cooperation, one may have to consider their ability to carry long accounts.

Theoretically one can sell cheap conversions demanding all cash in advance and never lose a dollar for uncollectable accounts; but unfortunately you would never build a load this way. Also, such jobs frequently result in very high operating costs and the ultimate loss of many customers. Such losses give a black eye to the project and if too large a proportion of such jobs are sold, it is possible for the community to form an opinion that gas househeating is too expensive. Where gas designed equipment is sold and installed with the necessary improvements to the existing circulating system on terms within the reach of the customer, the operating cost will compare favorably with the previous fuel and you have not only a permanent customer, but a booster as well.

The fact that a prospect has kept his past accounts with the company in good standing should always entitle him to credit for the proper househeating equipment necessary to secure satisfactory results. There should be no need to check up on his whole career and ancestry. His credit rating should be based upon his reasonable expectancy as to general ability to pay. A tremendous percentage of people are honest and live up to their obligations.

The reserve set up for uncollectable accounts will have to be comparable with your credit policies. Experience has proven that three per cent of the gross merchandise sales set aside as a bad debt reserve will provide reasonable protection and get the largest volume of business possible. Such a reserve should be set up and maintained separately from other reserves so as to reflect a true picture of the situation at all times, thus avoiding any unjust burdens being placed upon either this or other activities.

The status of ownership of the premises should not necessarily affect the customer's credit. A large number of people are buying their homes on contract and you must take a chance with them.

Recently, one company decided that they would have to have a release from the mortgagee in all instances of mortgaged premises. This was to protect the company against demands for the replacement of the original equipment in event of loss of property through foreclosure. This policy paralyzed business from this source completely. Finally, when a check was made, it was found that the company had experienced this

situation only in an extremely negligible number of cases during the four years of the depression and after selling a large number of such jobs. Needless to say, this precaution was at once abandoned.

Throwing prudence to the winds is not advocated, but at the same time the househeating merchandise bears a satisfactory sales margin, and as you are out for the gas load, it behooves you to lean over a trifle backwards in order to put economical househeating within the reach of as many as possible. The law of averages will usually take care of the situation. Suppose you do experience a few losses here and there; you cannot expect to build such a load with a wholly self-supporting profit-earning sales department. You may as well decide at once what you can afford to spend for this increased business and then be governed accordingly.

EXHIBIT I.

Street No.	Street Gaylord OCCUPANT	Gas Range	Water Htr.	Refrig.	Automatic Water Htr.	Laundry	Floor Furnace	Unit Heater	Gas Garage Htr.	Incinerator	Ct. Dryer	W. Still	Gas Clothes Dryer	Gas Industrial	Thermostat	Oil Tank	Unit Air Cond.	Hydronic	Circulating	Gas Htg. Store	Conversion	Master Card	Date Called	V=User P=Prospect REMARKS	Date Call Again
1401	R. L. Jones																								
07	C. B. White																								
09	A. R. Smith																								
13	K. M. Gout																								
17	O. U. Weller																								
25	S. R. Virtue																								
33	W. A. Pratt																								
47	R. G. Smalley																								
51	G. B. Silver																								
55	O. B. Crumley																								
63	T. S. Hackney																								
67	V. S. James																								
73	T. A. Blair																								
81	Glenn Johnson																								
87	Fred. Holton																								

Specimen Page from Canvass Book

Advertising—Appropriations for advertising must be very liberal and the activities extensive. The community as a whole will have to be made gas conscious and favorable mass psychology will have to be developed to secure public acceptance. Such an activity, well directed, is necessary to pave the way for the sales representatives in their daily rounds.

Full advantage should be taken of billboards, radio broadcasting, white space, direct mail and other legitimate means of getting and keeping the idea of gas househeating before the public. However, knick-knacks and what-nots have little place in such a program.

In considering advertising expenses, that of man power should receive full consideration. There is no question but what a good well trained sales representative calling from door to door and telling the househeating story in an intelligent impressive manner is doing some very good advertising in addition to the actual signed contracts he brings in. Your salesmen are a standing army distributed throughout your locality and when properly trained are of great value in a number of ways other than actual selling.

Be honest with yourself in handling this advertising account and do not permit it to become a dumping ground.

Collections—At the first thought the subject of collections is out of place at this time as it is assumed that you are only covering the selling of the load. However, much valuable cooperation can be received from this department. Competitive fuels are very commonly sold on the basis of a minimum number of deliveries during the year and the payment spread over the season or in some manner convenient to the purchaser. This materially helps one whose budget requires close consideration. Theoretically, we cannot do this with gas and, therefore, the few severe months of the heating season often force a hardship upon one whose ultimate ability to pay is satisfactory. However, an understanding collection department should be able to help this situation with a minimum of embarrassment to the customer. This is something the individual company will have to work out. There are instances on record where some companies do bill the customer an even monthly amount spread over the entire heating season. It would be a further help if this could be divided over the entire year. Of course, these monthly payments are based on the yearly estimate and balanced out at the end of the heating season. Do not confuse this with any flat heating rate.

A thoroughly cooperating collection department can help materially in their activities on repossessions of equipment for delinquencies in payments. Of course, non-payments cannot be ignored but it is certainly true that repossessed used equipment in the warehouse is not revenue producing. There is nothing to be gained by taking a good dollar from one pocket and putting a badly depreciated dollar into another. So, if you repossess revenue producing equipment, credit accounts receivable merchandise, and debit merchandise stock, it is as bad as trumping your partner's ace, if there is a fair prospect of getting the commodity charge and something on the merchandise account. One should give such accounts all possible consideration.

Rates—There is no need to go deeply into rate structures at this time as this problem is in general quite well handled. However, there are some salient features that can well be emphasized. It is quite true that there are a limited number of people who will pay any price for gas heating, but volume of business is essential to the success of your undertaking, and, therefore, you must base your rates on the smallest possible sound working margin to get permanent results quickly. The theory of a maximum rate for the first few years and then reducing after apparent saturation has been reached at this point in order to increase business is not sound. The entire program must be started with a "bang" and an intensive campaign carried on that will produce the desired mass psychology and make the public gas minded. When this objective has been attained, it must be capitalized to the limit.

After the average domestic requirements, approximately 3000 c.f. of natural gas, your rates should drop as quickly as possible to the minimum for house heating uses. It must be considered that where house heating is sold on an extensive scale, there is a material additional amount of gas sold for water heating purposes. In practically all cases a good salesman will sell his customer on the idea of removing the water coil from his furnace and where terms are liberal on combination sales he will sell an automatic storage system. This results in an appreciable

SPECIAL HEATER AGREEMENT EXHIBIT 20

You have purchased from the [redacted] COMPANY [redacted] heater, to be kept at.....for the price of $.....to be paid in monthly installments of $.....

It is agreed that all monthly payments and any equipment accepted as cash to reduce the purchase price of said heater , shall be retained by the Company as rental. When your total payments equal the purchase price of said heater it thereupon becomes your property.

Only.....will be accepted for trade-in allowance at $..... No trade-in allowance will be made after six months from this date.

Your failure to make any monthly payments within thirty days from date of bill cancels this agreement, and entitles Company to immediate repossession of heater.

Dated at [redacted] this.....day of 1933

[redacted] COMPANY [redacted]

BY.....

WITNESS .....

Form 449 R. S. 1933 5-33 EXHIBIT 21

Address | Folio

Name | Date

Nature of Claim

Claim by Repr. Territory No.

Claim Allowed by Acct. Dept. Date

Paid on Commission Sheets of

Remarks

Exhibit 20—Rental Contract Used on Special Occasions for Circulating Heaters Only; Exhibit 21—Rental or Bonus Claims Form

increase in revenue and consequently in the amount of the customer's bill, where he has previously used gas for cooking only in the winter time. It is quite probable that, though you may sell him only $90.00 worth of heating gas, still his total year's bill may increase, say $105.00 for the above stated reasons. Therefore, rates should be so governed.

The more simple and understandable your rate structure is, the less trouble you will have. It is quite possible to devise highly scientific rate structures which have a great deal of merit, but the public rarely understands them and when there is too much explaining to do, it puts one on the defensive unnecessarily.

Personnel—The size of the house-heating sales organization will naturally depend and be governed by the potentialities of the locality. Experience has proven that there should be one man for each 2,000 gas customers. With this number of representatives each man can canvass his entire district and contact each customer twice a year. These sales representatives should be high type men who have proven themselves as to their general ability to sell. The compensation should be such as to interest men who will make themselves permanent fixtures in the organization. This is no place for the common type high pressure, short lived salesman. You are building a permanent structure which cannot be jeopardized by some high powered fly-by-night, glib tongued artist. Such a man is prone to get signatures on the dotted line through false promises and other short cuts, rather than good salesmanship. This type of man does not reflect the true spirit of the company.

When properly chosen and trained these men are more than just salesmen; they are in reality the company's district representatives whose major function is to sell gas house heating. They should be of a type who can inspire the confidence of their public and thereby do much towards creating good will and desirable public relations. Such an organization of men, in addition to their daily services rendered, constitutes a valuable reserve force in times of stress and emergency.

The heating engineer, in addition to being a good engineer, must also be sales minded. Without the latter qualification much undue hardship can be placed upon the activity. It must be borne in mind that while we desire to sell all of our installations perfect, still this is impossible in the majority of the cases. Therefore, what is required is some one competent to furnish the sales representative with the proper recommendations for the particular job and then it is up to the salesman to sell the job the best he can.

This heating engineer will have helping him a sufficient number of estimators to handle the work of surveying the prospective jobs and doing the necessary detail work. It is a good practice to have each new salesman spend his first month in this department.

In the general office set-up, there should be some one especially trained to meet the public and discuss their problems with them. Such a party when well informed and diplomatic can be of material value to the department in keeping jobs sold. While it is the sales representative's responsibility to handle the department's business in his particular district, still as time goes on there will be numerous situations arising where the customer will feel the need to make calls at the office. Time and experience have proven that a contact man as above described is quite necessary. Of course, he will have other varied duties, for usually he is a general clearing house for the sales representatives and the other departments in addition to relieving the one in charge of much routine work.

Compensation—The sales representatives should be protected with a minimum drawing account sufficient to care for their basic necessities, and at the same time, it should be possible for a good man to earn a substantial return. A good set-up will include a fixed bonus on each job sold. This bonus will vary with the type of equipment. Naturally a gas-designed job should pay more than a conversion. It requires more effort to sell but when once installed properly it will be more likely to remain permanently, so both the company and the sales representative should benefit for the extra effort and salesmanship.

The compensation should also include a liberal percentage of the gross merchandise profits on the job, a percentage of the increased annual revenue and a percentage of the cash payment made by the customer. The first is quite important, for if it is a matter of money in or out of the salesman's pocket, he will overcome sales resistance on price and he will not only make money for himself but for the company, which in turn will materially reduce the cost of the activity. The second consideration is only natural. Load building is the main objective and you certainly should encourage and reimburse your men in direct proportion to the results they achieve.

Do not underestimate the value received from allowing the salesmen a percentage of the cash down payment they collect. A large activity of this kind requires a substantial financial outlay and any ready cash that can be secured is of a material benefit. Salesmen are only human like any one else. Why should they endeavor to get a down payment higher than the regular terms if it does not mean anything to them? A survey of the activities of a representative group of salesmen along

(Continued on page 33)

Testing Laboratory Wet Gas Meters

Wherein Is Described A Convenient Procedure for Determining the Correct Water Level for This Style of Meter

By HOWARD S. BEAN

Physicist, U. S. Bureau of Standards

THERE are many instances in laboratory work when it is necessary to determine a gas volume with as much certainty as possible. A very common example of this is in the determination of the heating value of a gas with a calorimeter of the Junker's type. With the ever increasing importance of the heating value of commercial fuel gases the volume of gas burned in the calorimeter must be determined very carefully. The small wet gas meter is generally considered one of the most satisfactory types of meters for such work, and when carefully adjusted and operated its indications may be relied upon to within about one-half of one percent. The purpose of this paper is to describe a convenient test procedure for determining the correct water level of these meters, especially those made to measure one-tenth of a cubic foot per revolution of the large hand.

The method of connecting the meter to be tested to the standard bottle is shown in Figure 1. The object of this manner of connecting the meter and bottle is to have the air always pass through the meter in the normal direction, regardless of whether the air is entering or leaving the standard bottle. The procedure to be followed to obtain this result is described in the following paragraphs.

As is the general custom, the calibration is made with air, which in this case enters the system through the saturation or bubble bottle, D. The inlet tube into the saturator should not extend more than one-eighth inch below the surface of the water. The thickness plates, E, to be used under the movable tank, as later described, should range in thickness from about one-thirty-second inch to about one-fourth inch, and there should be enough of them to give a total thickness of about three-quarters of an inch.

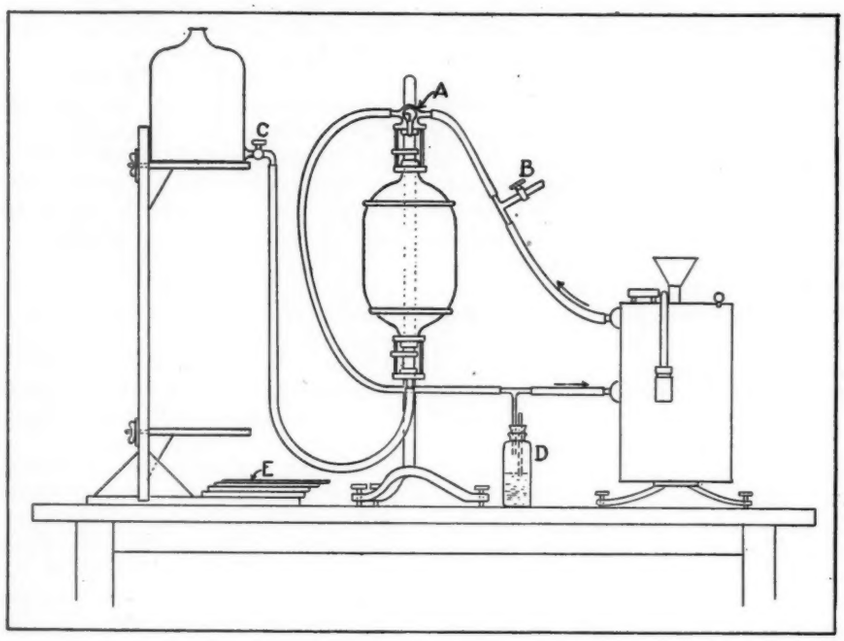


Diagram of Connections for Tests

Position 1 of the three-way cock "A" connects the standard bottle with the meter inlet. Position 2 connects the bottle with the meter outlet.

To prepare for the test we first make sure that there is enough water in the tank and bottle system to slightly more than fill the bottle and connecting tubing when the tank is on the upper shelf. Starting with the tank on the upper shelf, and cocks B and C open, (cock A may be in either position 1 or 2), lift the tank above the shelf high enough to cause the water to rise in the upper bottle neck almost up to cock A. (Care must be taken not to let the water enter cock A and the tubing.) Close cock A and replace the tank on the upper shelf. Close B, turn A to position 2, then open C. The water should fall in the upper neck of the bottle against the back pressure of the meter and the pressure drop through the saturator, and come to rest with the bottom of the meniscus in the plane of the top of the gage yoke about the glass of the upper bottle neck. If the water comes to rest above or below this level adjust the position of the shelf until the water does come to rest at exactly this level.

Next, hold the tank several inches below the upper shelf so as to draw some water into it from the bottle, and then close C. Place several thick-

Publication approved by the Director of the Bureau of Standards of the U. S. Department of Commerce.

ness plates on the upper shelf and set the tank thereon. Turn cock A to position 1, open B and then open C. If the correct amount of thickness plates has been placed under the tank the water will rise in the upper bottle neck against the back pressure of the meter and again come to rest with the bottom of the meniscus in the plane of the top of the gage yoke. It may be necessary to repeat this several times in order to determine the correct number of thickness plates to be used. (If B is open it will only be necessary to shift A to position 2 when drawing some water from the bottle into the tank.)

Again close cocks C and B, then turn A to position 2. Place the tank on the lower shelf and open C. When the water has passed from the bottle into the tank it should come to rest with the bottom of the meniscus in the lower gage glass in the plane of the top of the lower gage yoke. If the water does not come to rest at this level adjust the position of the lower shelf until this result is secured, following the same manipulation of the cocks as described for the upper shelf. Next, determine the number of thickness plates to be used with the lower shelf in the same manner as that described for the upper shelf. If the meter is in good operating condition the number of thickness plates to be used will be the same, or very nearly so, for both shelves.

Reason for Adjustments

The reason for adjusting the position of the shelves and the number of thickness plates to be used in this manner is to provide, in effect, two positions for each shelf. It will also be seen that the total amount of thickness plates, which measures the difference between the two positions of either shelf, produces a head of water equal to twice the pressure drop through the meter plus the pressure drop through the saturator.

With the position of the shelves and the number of thickness plates to be used with them determined, we proceed with the calibration of the meter as follows: The tank being now on the lower shelf, and Cock C open.

Open B, and with A in position 2 hold the tank several inches below the lower shelf thus drawing water well down into the tubing below the lower bottle neck.

Close C, place the proper number of thickness plates on the lower shelf and place the tank thereon.

Turn A to position 1, leaving B open, and open C. When the water has come to rest with the bottom of the meniscus in the plane of the top of the lower gage yoke note and record the reading of the meter.

Close C and place the tank on the upper shelf *with* the proper number of thickness plates under it. Open C. When the water has come to rest with the bottom of the meniscus in the plane of the top of the upper gage yoke note and record the reading of the meter.

Lift the tank above the upper shelf so as to raise the water well up into the upper bottle neck (being careful not to raise it high enough for water to get into A), and close C. Remove the thickness plates from the upper shelf and place the tank thereon.

Close B and turn A to position 2. Open C, and when the water has come to rest with the bottom of the meniscus in the plane of the top of the upper gage yoke note and record the reading of the meter.

Close C and place the tank on the lower shelf *without* the thickness plates. Open C. When the water has come to rest with the bottom of the meniscus in the plane of the top of the lower gage mark, again note and record the meter reading.

This procedure constitutes one complete test cycle of two runs. The reason for holding the tank below the lower shelf or above the upper shelf before taking the first reading in either case, is to have the water approach the gage marks at the start of each run in the same direction it will be moving while the run is actually under way. In this way all "slack" will be taken up before the start of each run, and provides a running start as nearly as is possible.

If there are no leaks in the meter or connections the difference between the first pair of readings should agree with the difference between the second pair of readings, within the limits of accuracy to which the meter indication may be read or estimated. If these differences are not the same then there is a leak in either the connections or the meter case which must be stopped before proceeding further with the test. If the first difference is the smaller the leak will be between the bottle and meter inlet, or in the inlet well of the meter. If the first difference is the larger the leak will be between the meter outlet and bottle, or in the outlet chamber of the meter. Of course it is conceivable that there might be leaks of equal magnitude in both the inlet and outlet connections, but such a condition is extremely unlikely.

This check upon the tightness of the meter and connections is one of the advantages of the procedure. Another advantage is the rapidity with which the test may be made, since the meter test is going on when the tank is on both the upper and lower shelves.

Employee Education

(Continued from page 26)

it can be seen that this is augmented at certain specified times with Employee Direct Selling Campaigns and at other times the various units of the Customers-Relation Course. While these are in process the principles learned in the Salesmanship Course are continually under review and given particular emphasis just before the Direct Selling Campaigns to analyze the appliance which will be helpful to the employee.

There should also be mentioned the Employee Suggestion Contest, during which time all employees were encouraged to submit their suggestions as to new ways and means to increase revenues or operating efficiency or any other idea which would be of value to the company. The results of this contest were very productive of many ideas which could be immediately put into effect and contributed materially to an increase in the efficiency of the operation and made the employee feel that his contributions received attention by the management.

Another activity which was undertaken to further the contacts between employees and customers was a Recipe Contest sponsored by the management. The purpose of the contest was to tap the possible sales outlets among employees and relatives who were customers or potential customers in order to broaden these contacts and focus attention on gas service and the use of modern gas appliances. As a stimulus, a modern gas range was awarded to lucky winners, one on the Canadian side and one on the American side. Contestants submitted their favourite recipes, and at the same time were urged to offer suggestions which would be of benefit to the company in its relations with its employees or customers. There was an enthusiastic response to the contest and over 1,000 recipes were submitted. In addition, many valuable ideas were received which were utilized in future policies as they affected customers' relations. Leads for sales were obtained, and the company received good advertising as a result of the contest, as it was featured just before the inauguration of the Holiday Gas Range Sale.

Also worthy of attention in connection with the educational policies of the company is the practice of establishing a School of Practice for college and university men. This school, sponsored by the parent company of The Dominion Natural Gas Co. Ltd., since its organization has selected picked men from the colleges and universities and put them through a period of training in all phases of public utility operation. Over 1,000 young men have had the privilege of attending this school while employed by the company, and have found their niche in some phase of the companies' vast operations. Of particular value is the broadening influence exerted by this school in drawing these men from schools of higher learning and in stressing the value of engineering experience and salesmanship, particularly in the industrial field.

There is also in existence in this group of properties a plan utilizing the contacts which independent dealers in the various communities have and in co-operating with them in the sale of gas-burning appliances. Contracts with approved dealers have been drawn up and certain concessions have been made in the manner of commissions to these dealers. This has made them favorable to the Gas Company, because they have been able to sell up-to-date equipment and have been featured in all advertising during the campaigns.

In conclusion, all of these correlated employee activities have contributed much to keeping the organization on its toes, have promoted its appliance sales, bettered its customer relations and encouraged its employees to become more salesminded, more active in the organization's undertakings and have helped them reap more rewards for themselves in compensation and training for future jobs.

Thoughts on Cold 70

(Continued from page 10)

ing of warmth in all combinations of temperature, humidity and air motion . . ." The American Society of Heating and Ventilating Engineers has conducted many tests to determine the comfort zone for different air velocities.

Among other factors that improve a Cold 70 condition, insofar as the temperature gradient is concerned, is the selection of the proper type and location of radiators, shields and enclosures, and warm and return air registers.*

While the intermittent operation of the installation may have a tendency to make the Cold 70 condition more noticeable during the off-periods, it quite often will be found that the maintained temperature with gas heat is several degrees less than that maintained with solid fuels previous to the change to gas, and, with rapid radiation of the body heat to the cold wall, (the inside surface temperature being low due to a high co-efficient of heat transmission, U—equation 1), the body temperature is reduced to a point below the lower limit of the comfort zone.

* *University of Illinois Bulletins.*

Building Househeating Load

(Continued from page ??)

this line is quite interesting and shows what different men can do.

Should the job come out before the lapse of a year, some of the above items can be charged back against the drawing account on the same base they were paid. This penalizing will inspire the sale of good jobs. All of this will appear as entailing a great deal of accounting but it is an expense that will work out very favorably in the long run. It will be found to be fully justified over a period of time.

In addition to the above items of remuneration there will, of course, from time to time be various prizes and special inducements. Along this line, there will be nothing better than cash on the "barrel head," especially during periods when business is slack. Transportation expense is high for the salesman, and frequently his activities can be materially accelerated if he knows that he will receive a couple of dollars in cash at the morning meeting if he brings in an order.

All men should meet for a short period at the office each morning at which time lectures can be given and various matters of interest discussed. Bulletin boards should be prominently located showing each man's standing on a daily, monthly, and yearly base as this will make their individual records plain and will certainly have the desired results.

The compensation structure with one very successful company is as outlined above. The sales representatives receive one-third of the gross profits on the merchandise and job work sold which applies against their drawing account. In event the drawing account is not earned they, however, receive forty per cent of what they actually earned in addition to the regular drawing account. This feature of the compensation will eliminate the "what's-the-use?" idea that may occur during dull periods and is an ever present incentive to the men to exert their best efforts at all times. Considerable thought should be given this point and it will, therefore, be explained in detail. We will take a specific example. Supposing that during a very dull month a salesman sells one job only, and it happens to be a gas-fired warm air furnace upon which there is a specified regular bonus of $5.00. The gross profit on the merchandise and job work sold is $48.00. The estimated annual revenue from the job is $100.00, of which he gets $5.00. He collected a down payment of $60.00, of which he gets $3.00. He then actually earned on this job a total of $29.00. He would then on the first of the month draw his regular drawing account and on the middle of the month he would receive 40% of this $29.00, or $11.60, which would make his efforts well worth while.

Salesmen are temperamental and should be given as much freedom and be allowed as much initiative as possible. However, it remains a fact that very few people are able to direct their own personal efforts to the best advantage and, therefore, they will naturally require direction and supervision. When the organization is large they should be divided into groups composed of from 6 to not more than 10, and each group headed by a supervisor.

Each salesman should be provided with a canvass book containing sheets ruled both vertically and horizontally, the customer's name and address appearing on the horizontal line and the various equipment listed at the top of the vertical lines. Spaces should be left for checking the equipment they already have and what they may be interested in, when last called upon, etc.

A copy of one of these sheets (marked Exhibit 1) is reproduced herewith. Each man should be made to keep his book up to date. The information contained therein is quite valuable in direct mail advertising and for special campaigns when efforts are being concentrated along specific lines of equipment.

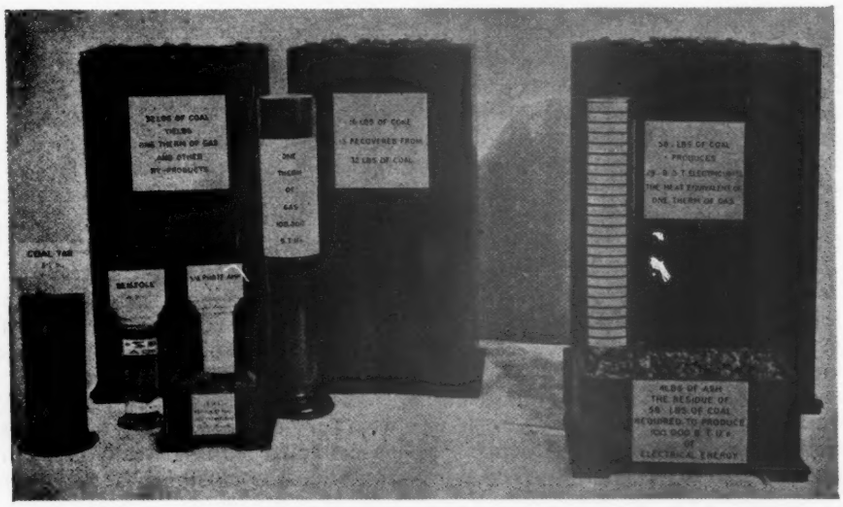
Also, each man should have printed forms upon which he can carry a record of a representative number of jobs installed showing actual operating costs. Copy of suggested form is shown marked Exhibit 2.

(Continued in August issue)

Technical Digest

A VISUAL COMPARISON OF GAS & ELECTRICITY PRACTICE

Models intended to convey a general comparison between the two industries have been made by an English firm. The calculations are based on a 70 therm per ton of coal carbonized, and on an average of 2 lbs. of coal per B.O.T. unit of electrical energy. The models demonstrate that 32 lbs. of coal give 100,000 B.t.u. of energy and, in addition, half of the original weight in coke. Condensable products from the coal and gas comprise 1¾ lb. coal tar 1/20 gal. of benzol and 1/3 lb. sulfate of ammonia.



The models illustrating the electrical industry show that on the same basis 58½ lbs. of coal are required to produce 100,000 B.t.u. of energy, equivalent to 29¼ B.O.T. units.

There are no by-products except approximately 4 lbs. of furnace refuse. Thus it will be noted that in respect to coal usage the ratio is 7 to 4, based on the therm as the unit.—*—Gas Journal, vol. 205, p. 85, 1934.*

GRANULATED BLAST FURNACE SLAG FOR DRY BOX PURIFICATION

Favorable results are reported in the use of granulated blast furnace slag in admixture with oxide for dry box purification. Data collected from one year of operation is the basis for this conclusion.

The best type of slag for this purpose was found to be formed by spraying water into molten slag. The granulated slag found satisfactory weighed not over 35 lbs. per cu. ft., had not over 40% moisture content and consisted of sizes from sand to 6" lumps. A mixture of equal weights of slag and oxide was used for filling the boxes to the same depth as with shavings-oxide. Eleven boxes having 120,000 bushels capacity have been in operation and purifying a daily average of 33,000 MCF of 300 grain H_2S gas.

Slags can be obtained which will give favorable back-pressure comparisons with shaving-oxide. On an average, the back-pressure increase does not exceed 25%, if the slag is of the proper type, and the water content is properly controlled during mixing.

The spent material is of value as a substitute for pyrites in acid manufacture and can be produced to satisfactorily meet the requirements for this purpose.

Operating methods with slag-oxide mixture show numerous advantages. There is a gain of 50% in removal capacity, without reducing the rate of flow. Using an average flow rate of 12.0 MCF per day per ton of Lux, in a four box series shavings-oxide was fouled to an average of 1.0 lb. of sulfur per pound of Lux in three foulings. With slag-oxide, using the same flow rates per ton of Lux the sulfur can be brought up to 1.5 lbs. per pound of Lux.

Due to its greater density, a 50% increase in Lux content in filled slag-oxide boxes is secured, which gives a further 50% increase in purifier capacity. These factors have resulted in a 50% reduction in the number of boxes dumped in a year. The proper sulfur content can be obtained in one or two foulings if the amount of oxygen in the gas and its flow rate are correctly maintained.

In addition to the favorable factors mentioned above there should further be taken into account the elimination of expense in spent oxide removal, reduction of fire and explosion hazard, reduction in oxide mixing cost from 1.2c to 0.8c per bushel, reduction in material cost of 75%, and better removal of sulfur and nitrous oxide due to lime in the slag.

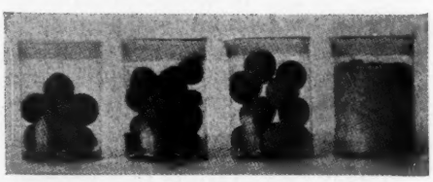
Unfavorable factors in the use of slag-oxide are an increase of about 25% in back-pressure, an increase in dumping expense, care in the selection and purchase of slags and close attention to the control of tar in gas, moisture in the oxide and details of operation.

—R. L. Presbrey before Joint Production and Chemical Conference, American Gas Association, May 21-22, 1934.

NEW DRY PURIFICATION PROCESS

A new method for the operation of the dry purification of city gas invented by Raffloer is described as working on a semi-large scale at the Concordia Colliery, Oberhausen, Ger.

The feature of the process is the use of a compacted oxide in the form of small balls, 0.6-0.8 inch in diameter, made by a special process. These balls permit a uniform packing in the purifier, distribute the gas uniformly over the cross section of the purifier and create only a slight back-pressure. The purifiers are easily revivified, discharged and the sulfur extracted with carbon disulfide, from which it is obtained in a marketable condition.



The balls of iron oxide are of a high degree of porosity and, in addition, are very strong.

Two towers charged with the oxide balls are used in the purification system. Tar free gas is passed

AN ORGANIZATION OF EXPERTS •••

not merely water heating salesmen

•

EVERY man who sells American-Bosch Kompak water heating equipment is a sales engineer. Each is an expert whose life work is the study of heating water by gas. Each is thoroughly grounded in the principles of water heating engineering. Each of them places this knowledge and experience at your service.

These experts have designed and installed many of the largest gas water heating plants in the country. Their experience is especially valuable in installations where large quantities of hot water are required; such as in hospitals, apartments, clubs, institutions, etc. In many cases, their assistance has made it possible for gas companies to retain desirable gas loads and to acquire new ones against the competition of other fuels.

In addition to its well-known "Domestic" Heaters, the American-Bosch Kompak line includes large volume water heaters that are adaptable to practically any installation. The new Model "M" type Electrically-Circulated Hot Water Generator has solved many problems for gas companies because it is easy to install. Where smaller quantities of water are required a complete line of multi-coil heaters is available.

Kompak Sales Engineers are at your service—at an instant's notice at any American-Bosch office. They stand ready and equipped to render expert advice on any water heating problem—entirely without obligation. Write today for new catalogue and full information.

{ The makers of American-Bosch Products have always taken pride in creating, designing, building and selling products superior to those commonly in use. Proven leaders in their fields, they are built up to a high standard of quality and not down to a price. }

Gas Appliance Division

UNITED AMERICAN BOSCH CORPORATION

SPRINGFIELD, MASS. *New York Chicago Boston Pittsburgh*

AMERICAN-BOSCH

KOMPAK

NRA CODE

upward through one of the towers and freed from hydrogen sulfide leaves the top. When the contents of this tower have become fouled, the gas is diverted to the other tower, air being passed in an upward direction through the first tower to revivify the iron oxide. At the end of the revivification period, a portion of the bottom material is discharged at the bottom and fresh material added from above. The towers are designed for the purpose of discharging the fouled oxide at the bottom about once every three days.

The oxide discharged and saturated with sulfur is extracted with carbon disulfide, which recovers the sulfur, the purity and color of which depend upon the extent to which the gas has previously been freed of tar.

While the normal gas velocity in oxide box purifiers is 0.2-0.28 inch per second, the velocity in these towers may be as high as 4 inches per second. The back pressure caused by the tower filled with oxide balls is approximately 3 in., W-G. Complete removal of hydrogen sulfide is claimed even when it is present in a concentration of 85-140 grains per 100 cu. ft. of gas.

The experimental plant at Oberhausen, Germany, consists of only one tower with internal diameter of 2 ft. 3½ in. and a height of 16 ft. 5 in. and suffices for the purification of 140,000 cu. ft. of gas per 24 hours.

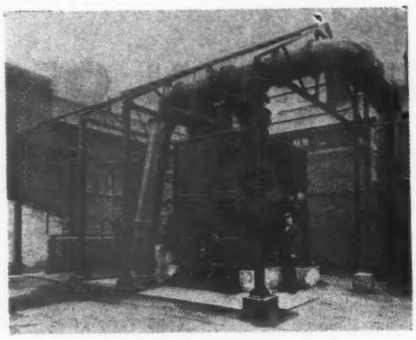
For the purification of 3.5 million cu. ft. per 24 hours, two towers of internal diameter 12 ft. 8 in., and 19 ft. 8 in. in height would be required. The ground space required would be only 270 sq. ft. compared with 2,160 sq. ft. in the case of box purifiers.

The economics of the process can be determined if it is assumed that from the purification of 3.5 million cu. ft. of gas per 24 hours, having a sulfur content of 23 grains of hydrogen sulfide per 100 cu. ft., there is obtained 1,760 lbs. of sulfur per day. Assuming that the spent oxide would contain 45 per cent of sulfur and that one third of the discharged spent oxide is discarded, the author calculates that the net cost of purifying 100,000 cu. ft. of gas per day would be $0.21 (marks converted at par of exchange).

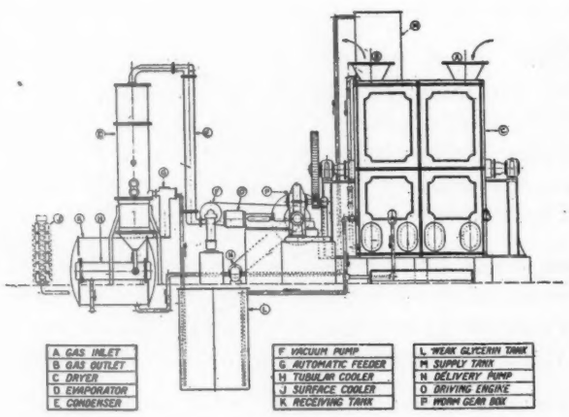
—A. Thau, Das Gas-und Wasserfach, vol. 77, p. 33-35, 1934.

THE GLYCERIN GAS DEHYDRATION PROCESS

The advantages of dry gas are shown in the operation of a plant at Luton, England, where glycerin is used for dehydrating the gas. Over a period of 17 months when the glycerin process was in operation service stoppages due to water were reduced from a high of 363 per month to 3 or 4 per month.



The operating cost of this process being under ½% 1000 cu. ft., less than four tons of glycerine are required per annum on a production of 850 million cu. ft. of gas. A series of tests carried out show that the dew-point of the gas was reduced 20 to 25°F. and that the humidity extraction achieved constituted a 60% reduction in saturation.



The attainment and maintenance of these figures is a matter of putting sufficient strong glycerin through the plant. In its operation concentrated glycerin flows into a washer counter current to the gas, through four sections of the apparatus. The glycerin is concentrated at a vacuum of about 27 in. at 120°C, a strength of 60-62°Tw. The concentrated glycerin is then passed through a cooler to a storage tank from which it flows to the washers. The glycerin circuit is entirely closed and no corrosion, pumping troubles or sludging was experienced.—

A. F. H. Knowles & Roy Summerson, Gas Journal, vol. 205, p. 809-10, 1934.

REMOVING GUM-FORMING SUBSTANCES FROM FUEL GAS

Fuel gas is scrubbed with a solvent such as a heavy oil which absorbs gum-forming compounds, and the resulting enriched solvent is treated with a hydrogen-oxygen containing gas to reduce the vapor pressure of the gum-forming compounds present. The solvent is then recirculated to heat more fuel gas. Apparatus is described, also various other details and modifications of procedure.—*U. S. Pat. 1932525 to Koppers Co. of Del.*

PROTECTING GAS SERVICES FROM CORROSION

Corrosion on the inside of service lines can almost be completely removed when the gas has been dried, but added security can also be obtained by covering the inside surface of the pipe with paint or a protective oil and allowing it to dry before the pipe is laid. Experiments made with gas containing moisture show that the paint is softened, thus leaving the pipe exposed to corrosion.

The problem of preventing corrosion on the external surfaces of pipes was studied and it was found that a double wrapping by a fibre impregnated with asphaltic bitumen is better than a single wrapping. The imperviousness to water of these wrappings was determined by an electrical test in which the resistance to the passage of the current was measured.

Different materials for service lined pipe are discussed, with the conclusion that copper tubing appears to have the greatest possibilities, on account of its resistance to corrosion and its greater through-put of gas, as a results of its smoother surface.

Methods for the external protection of joints are discussed with the recommendation that the most nearly satisfactory material is a plastic bandage made from a closely woven material impregnated with petroleum jelly or similar grease.—

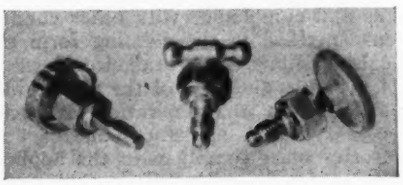
K. L. Clark, Gas World, vol. 100, p. 87-90, 1934.

EQUIPMENT NEWS

Improved Valve for Oxweld Blowpipe

A new type of needle valve—the ball-seat needle valve—is now being supplied on most Oxweld blowpipes, according to a recent announcement of The Linde Air Products Company, 30 East 42nd Street, New York, N. Y. The new valve design is a great improvement over the old, and is interchangeable on all of these blowpipes now in service.

The new type valve consists of a seat between the blowpipe body and the needle valve which is made of a hardened and highly polished stainless steel ball, held in a cage at the end of the valve stem. Tests have shown this type of seat to have sealing properties that are strikingly superior to other designs. This type valve closes readily with but the slightest effort of two fingers and opens with equal readiness. The polished ball frees itself readily of all foreign particles that might impair the gas-tight seat. Consequently, blowpipes using these valves will need less maintenance work than ever before.



The new ball-type needle valves for Oxweld blowpipes.

Electronic Relay Operates New Potentiometer Pyrometer

Bailey Meter Company, Cleveland, Ohio, has developed a new potentiometer pyrometer which has been named "Galvatron" after the Galvanometer-Electronic Relay Circuit which it employs to operate slide wire resistances and recording pens.

One Galvatron may include as many as four potentiometer circuits, the contact making galvanometer being automatically switched from one circuit to the next by relays actuated from contacts made by a synchronous motor driven time device. One powerful synchronous motor drives these timing contacts for the relay as well as the galvanometer contacting mechanism, the recording chart, and the automatic standardizing relay contacts.

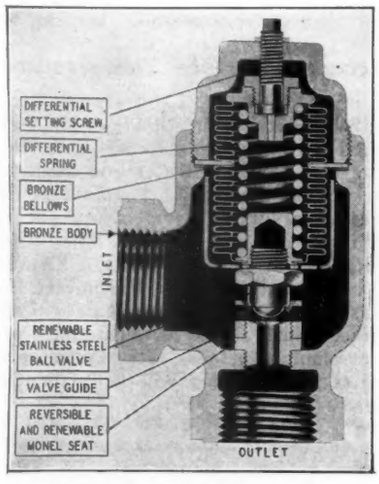
A feature of the Bailey Galvatron is its continuous record or records, up to four in number, made on a circular recording chart. When more than one record is provided for, each is made in a different color of ink so that it can be distinguished from the others on the chart, regardless of how many times they cross each other. In the case of a multi-pen Galvatron recorder, all records are continuous, although the contacts made by the galvanometer needle are divided among the potentiometers. In the case of a one-pen recorder, all contacts made by the galvanometer serve to adjust the potentiometer, which in this case is adjusted every four seconds if necessary. In the case of a four-pen recorder, each potentiometer receives a contact every 16 seconds, so that each record is a smooth continuous record of temperatures.

Descriptive Bulletin will be mailed on request.

New Thermostatic Steam Trap

The C. J. Tagliabue Mfg. Co., Brooklyn, N. Y., has recently brought out a new and greatly improved Thermostatic Steam Trap for Industrial Use. These traps are now offered in ½, ¾ and 1 inch sizes with greater capacity and far greater steam economy.

The exclusive TAG Differential Setting Feature, has been retained and continues to assure actual saving of steam. An adjusting screw located at the top of the trap may be set to discharge condensate at a temperature corresponding to as much as 20 lbs. less than the operating steam pressure, whether it is 50, 75 or 125 lbs., without any further adjustment.



Other outstanding advantages are the renewable and reversible double life Monel Seat, and a renewable Stainless Steel Ball Valve, the ball of which is true to within 0.00005 of an inch. As a further protection the renewable valve guide holds the ball valve central to the seat and thus insures tight closing.

Illustrated Bulletin mailed on request.

Improved Service Regulator

Three distinct improvements in service regulator design are embodied in the EMCO Ejector Type Regulator, recently developed by the Pittsburgh Equitable Meter Company, Pittsburgh, Pa.

The ejector principle of flow stream control provides both increased capacity and automatic loading. The gas flow as it leaves the orifice formed by the valve and valve seat, is guided in such a way that it enters the pipe line system with a minimum amount of pressure loss. Also the streamlined shape of the flow acts somewhat as a venturi, causing a decreased pressure as volume increases at a point just ahead of the entrance into the pipe system. This pressure is the pressure which exists under the diaphragm, and the regulator will act to maintain this low pressure point of the stream at the value for which the spring is set. Since this point becomes relatively lower than the pressure in the pipe line as the velocity (i.e. volume) increases, the effect is to raise the outlet pressure in the pipe line by the amount of the venturi effect.

Improving the diaphragm spring design, has decreased pressure variations to a marked degree, while the new Emcomold valve, found on this regulator for the first time, provides low shut off.

Additional information may be secured by writing the Pittsburgh Equitable Meter Company, Pittsburgh, Pa.

New Line of Direct-Connected Gas Engine Driven Compressors

The latest outstanding development in the field of air and gas compressors, which comes from the plant of Ingersoll-Rand Company, is the "Type XVG," a complete new line of direct-connected gas engine driven compressors. The units consist of vertical 4-cycle multi-cylinder "V" type gas engines with direct-connected standard I-R horizontal compressor cylinders. This modern arrangement results in remarkably well balanced smooth running machines, the moderate weight of which permits shipping from the factory completely assembled units. Light shipping weights, easy handling, small foundations and buildings required, simple erection—make an "XVG" installation very inexpensive. Light, strong

reciprocating parts, large bearings, low piston speeds and conservative ratings, insure low maintenance costs and long life.

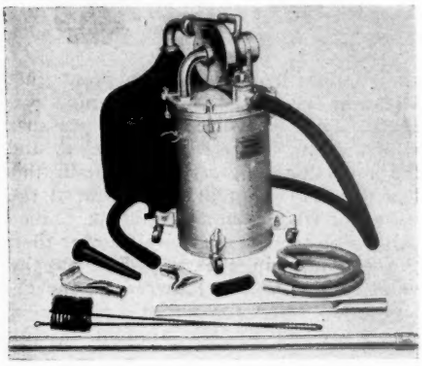
The "XVG" is built in four sizes of 60, 125, 190 and 260 HP, with 2, 4, 6 and 8 power cylinders respectively, two power cylinders for each compressor cylinder.

The new compressors have found a ready acceptance in the oil and gas fields and their use is rapidly extending into other industries.

New Model Tornado Furnace and Boiler Cleaner

The Breuer Electric Mfg. Co., 852 Blackhawk Street, Chicago, Ill., announces the development of a new Model 112 Tornado Furnace and Boiler Cleaner, a heavy duty unit of great power.

Specifications include 1 H.P. ball bearing G.E. motor—46¼" waterlift—weight only 45 pounds—observation glass—complete set of 10 standard attachments.



Special feature of this new machine is the observation glass which allows operator to see dirt being removed when cleaning in out of the way corners of the boiler or furnace. Tremendous power is also combined with light weight to make for ease of handling and complete cleaning. Motor unit can be removed for use as a handy blower—special tools are also available for cleaning all types of special heating apparatus and accessories.

Descriptive literature mailed on request.

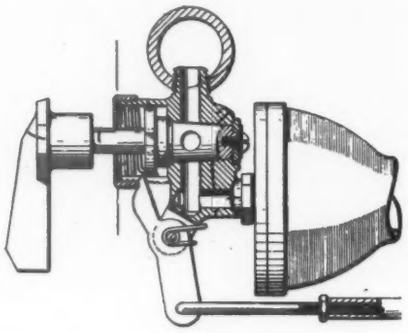
Unique Iron Body Gate Valve "Cut-out" Shows What Jenkins Offers

An unusual piece of valve literature is the twelve inch cut-out replica of a Jenkins Standard Iron Body Gate Valve recently prepared by Jenkins Bros., 80 White Street, New York, N. Y.

This cut-out is next best to having the real Jenkins Gate for inspection, as it provides an exact reproduction of both the exterior and the mechanism of a big, heavy Jenkins Valve.

New Thermostatic Safety Valve

H. W. White, Inc., Milwaukee, Wis., announce a new individual thermostatic safety valve, adaptable to the entire field of gas appliances. Its operation on individual gas range burners is positive and instant, shutting off the gas from any burner in case the gas is blown out by a draft or extinguished by water boiling over.



The valve is operated by a thermally responsive rod of special processing, which has a very high elastic limit and which successfully resists oxidization at temperatures aggregating 2700 degrees fahrenheit. This thermal responsive rod has a tensile strength approximating 120,000 pounds to the square inch annealed.

The body of the valve consists of cast bronze material and mechanism therein is of special hardened process. The valve is applicable to all types of gas ranges without costly changes of pattern equipment and the major operations of installation are entirely similar to present type of valve used. Descriptive leaflet mailed on request.

Accurate Surface Temperature

Illinois Testing Laboratories, Inc., 141 W. Austin Ave., Chicago, Ill., have issued two new bulletins:—One Bulletin, No. 1726, illustrates and describes the "Alnor" Pyroll Pyrometer for measuring surface temperatures of revolving rolls and driers. The other, Bulletin No. 1727, covers the "Alnor" Pyrocon Combination Pyrometer for measuring surface temperatures of flat surfaces, such as molds, dies, plates and other similar surfaces, either metallic or non-metallic. Copies will be mailed on request.

New Welding Lens

The Lincoln Electric Co., Cleveland, O., has issued a leaflet discussing the importance of proper selection of a protective welding lens, and describes the new Lincoln Supervisibility lens and illustrates graphically what happens when the various rays reach the lens. The new lens absorbs all objectionable rays and at the same time holds visibility at a point which permits a clear view of the work without tiring the eyes.

A. G. A. Revises Approval Extension Policies

The revised policies governing the extension of approvals of the American Gas Association Testing Laboratory, and which are to become effective January 1, 1935, are as follows:

1. The final copies of approval requirements shall be distributed to the gas industry at least nine months in advance of the date on which they are to become effective.

2. That, hereafter, all new and revised requirements adopted shall be made effective on January 1.

3. That approvals and/or listings granted, following compliance with applicable approval and/or listing requirements as determined by the A.G.A. Testing Laboratory, shall be effective for a period not to exceed five years, subject to satisfactory annual inspections and compliance with other conditions specified in the existing form of the Laboratory Application for Test.

4. That, at the time of the annual inspection after the expiration of such five-year period, appliances and/or accessories must comply with the applicable approval and/or listing requirements in effect as of January 1 of the year in which the period of approval and/or listing expires in order for approval and/or listing to be continued. Upon compliance with such requirements at the end of the five-year period, approval and/or listing shall be extended for another five-year period, subject to annual inspections and other conditions prescribed in the Laboratory Application for Test.

5. That all appliances approved before January 1, 1931, must, on or before January 1, 1936, comply with the applicable requirements in effect on January 1, 1935.

6. That all appliances approved during the calendar year 1931 must comply on or before January 1, 1937, with the applicable requirements in effect January 1, 1936. This same procedure shall be followed in increments of five years each for all appliances approved and/or accessories listed during succeeding calendar years.

It is felt that following out the procedure outlined above should greatly enhance the significance of the Laboratory Seal of Approval, encourage the development and marketing of better gas appliances and, in general, elevate the character of service rendered to the American public.

Gas Franchise Granted Piedmont Gas Company

A franchise for Hickory, N. C., has been granted to the Piedmont Gas Co., a newly organized corporation formed through the re-organization of the old Piedmont Utilities Corp. The gas company is supplying the cities of Newton, Conover, Granite Falls and Lenoir, N. C., as well as Hickory, with gas.

NEWS *of the* GAS INDUSTRY

N. R. A. Requested to Amend Gas Appliance Code

At a meeting of the Board of Directors of the Greater New York Stove Dealers Association, Inc., held at the Hotel St. George, Brooklyn, New York, a resolution was adopted requesting the N.R.A. to amend the Gas Appliance Code so as to prohibit the sale of gas appliances at retail by stove manufacturers. Benjamin Zises and Leon Epstein were appointed to confer with the Gas Appliance Institute in reference to bringing about the modification of the Code so as to prohibit the sale of these appliances by the manufacturers at retail. They are leaving for Chicago in the course of the next few days to confer with the Gas Appliance Committee, which makes its headquarters in that City.

The Association also adopted resolutions calling on its counsel Harry Sand to file formal complaint with the Public Service Commission in reference to certain alleged unfair practices of gas companies in reference to the sale at retail of stoves. The membership of the Association had, at previous meetings, authorized its directors to take such steps as were necessary to procure the discontinuance of the sale of appliances at retail by public utility companies.

May Winners in Blue Vase Refrigeration Sales Contest

Gas companies that won prizes or received "honorable mention" for the month of May in the nation-wide gas refrigeration sales campaign sponsored by the American Gas Association Refrigeration Committee have been announced by Ronald A. Malony, chairman of the Committee.

The campaign is known in the industry as the "Go-Getter" or "blue vase" contest. It began in April and will continue through June. Cash prizes totalling $6,700 will be distributed along with six blue vases which will go as trophies to companies coming out ahead in their respective divisions when the final returns come in. The presentation of the blue vases will be one of the features of the forthcoming A.G.A. convention at Atlantic City to be held late in October.

In the metropolitan group of companies known as Division A, the prizes were won by the Washington Gas Light Company. The other six companies which ran ahead in their respective divisions were: Providence Gas Company, Division B; Natural Gas Company of West Virginia, Division C; Utah Gas and Coke Company, Division D; Tyler Gas Service Company, Tyler, Texas, Division E; Iowa-Nebraska Light and Power Company, Division F.

The twenty-three companies that received honorable mention for May were: Division A: Southern California Gas Company, Los Angeles; Kings Appliance Corporation, Brooklyn, N. Y.; Philadelphia Gas Works Company; Boston Consolidated Gas Company.

Division B: Dallas Gas Company, Dallas, Texas; Columbus Gas & Fuel Company, Columbus, Ohio; New Haven Gas Light Company, New Haven, Conn.; Public Service Electric & Gas Company, Newark, N. J.

Division C: Southern Counties Gas Company of California, Pomona, Calif.; Harrisburg Gas Company, Harrisburg, Pa.; Scranton-Spring Brook Water Service Company, Scranton, Pa.; Consumers Gas Company, Reading, Pa.

Division D: Southern Cities Distributing Company, Shreveport, La.; Ohio Fuel Gas Company, Newark, Ohio; North Penn Gas Company, Port Allegany, Pa.; Central Illinois Electric & Gas Company, Rockford, Ill.

Division E: United Gas Public Service Company, Opelousas, La.; Community Natural Gas Company, Eastland, Texas; Texas-Louisiana Power Company, Breckenridge, Texas; Union Gas System, Coffeyville. Kansas.

Division F: United Gas Public Service Company, Huntsville, Texas; Gas & Electric Appliance Company, Caldwell, Ohio; Virginia Gas Distribution Corporation, Waynesboro, Va.

Gas Company Celebrates Fiftieth Anniversary

Showing scenes from Tacoma's album and the march of progress of its own company, the gas company of Tacoma, Wash., has been reviewing its history with the current celebration of its Fiftieth Anniversary in a citywide manner by showing the part it has played in building up Tacoma.

During the fifty years of its existence the gas company has been served in executive capacities by some of the leading business men of the city, some of whom are now distinguished in other lines. As part of its celebration of 50 years of progress the gas company displayed and demonstrated the latest achievements in kitchen appliances.

Municipal Gas Plant Costs Studied at Jamestown

The committee recently appointed by the common council of Jamestown, N. Y., to investigate the feasibility of a municipally operated gas system, has got to the point where it is studying the question of supplies and the costs of construction of manufactured gas plant, also the cost of piping the city. The corporation counsel has been instructed to look into the legal phases. So far, the committee has not been able to find the franchise, or copy, which was given to the Pennsylvania Gas Co. As the city has an uncollected tax list of something over $1,100,000, some citizens who have taken an interest in the matter are not so sure that it can be successfully financed at this time.

Major Strickler Presents Invitation To President To Attend Elks Convention

Major T. J. Strickler, vice-president and general manager of the Kansas City Gas Company, had the honor Monday, May 28, of personally presenting to President Roosevelt a handsome gold plaque invitation to attend the National Elks Convention in Kansas City. Major Strickler was in Washington on that date enroute to Atlantic City to attend the spring Executive Conference of the American Gas Association.

The national convention of the Elks lodge will be held in Kansas City July 15 to 19. Strickler is the chairman of the Elks Distinguished Guests Committee for the convention. The officials of the lodge were very anxious to have President Roosevelt in attendance at the Kansas City meeting. The president was enthusiastic in his welcome to Major Strickler and particularly appreciated the unique invitation but said he would be unable to attend, as much as he would enjoy it, because at that time he will be on the high seas. He said, however, he would preserve the plaque among his mementos.

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Cities Service Gas Co. Sells Drilling Gas

The Cities Service Gas Company, Bartlesville, Okla., has aided materially in the development of two recently discovered oil fields in Oklahoma. Although it was expected that gas as well as oil would be produced in these fields, this company laid gas lines into them at their inception to supply fuel to the wells to be drilled.

These fields are the Lucient area in T-20-N, R-2-W, about ten miles southwest of Perry, Noble County, Okla., where to date 33 wells have been drilled with Cities Service gas, and the Crescent Field, about ten miles northwest of Guthrie, Logan County, Okla., where seven wells have availed themselves of this service.

In addition to the natural gas, Cities Service oils, gasoline and greases were used exclusively in the building of those lines as well as by many of the drilling and trucking contractors operating in these fields.

Gas Heating Sales Record

The campaign for sales of gas house heating sponsored by Peoples Gas Light & Coke Co. (Ill.), Public Service Co. of Northern Illinois and Western United Gas & Electric Co., reached a new high level in May, with total sales reaching 2268 house-heating units or its equivalent. Since the campaign started on July 19, 1933, total of 20,416 heating units have been sold by the three companies.

Summer Rental Campaign on Automatic Conversion Burner

A summer rental campaign on automatic conversion burners is being conducted by the Birmingham Gas Company, Birmingham, Ala. Under this plan the customer pays $5 down and $3.50 per month during the seven heating months. If the customer keeps the burner the rental will apply on the purchase price, if not the company will take it out at its own expense. The offer has brought an encouraging response so far.

Michigan Gas Association

Officers elected at the annual meeting of the Michigan Gas Association at Grand Rapids, Michigan, on Wednesday, June 20.

President—D. W. Hayes, District Agent, the Detroit Edison Co., Port Huron, Michigan; Vice Pres.—D. H. Frazer, Jr., Vice President-Secretary, Battle Creek Gas Company, Battle Creek, Michigan and Secretary National Management Corporation, Benton Harbor, Michigan; Secretary-Treasurer—A. G. Schroeder, Secretary, Grand Rapids Gas Light Company, Grand Rapids, Michigan (re-elected).

Convention Calendar

September

1-4 International Gas Association, Zurich, Switzerland.

9-14 American Chemical Society Division of Gas and Fuel Chemistry, Fall meeting, Cleveland, Ohio.

11-13 Pacific Coast Gas Association, annual convention, Hotel Del Monte, Del Monte, Calif. Clifford Johnstone, managing director.

October

Week of 29th—American Gas Association Convention and Exhibition, Atlantic City, N. J.

Second International Gas Conference

The Second International Gas Conference will be held in Zurich, Switzerland, Sept. 1-4 next. All members of the American Gas Association are invited to participate. Clifford E. Paige, vice-president of the Brooklyn Union Gas Co., has accepted an invitation to address the meeting on the subject of "Developments from Coordinated Research and Coordinated Rate Making."

Detroit Company Features Gas in Industry

The Detroit City Gas Company recently featured "Gas in Industry," bringing the wide use of gas industrially to the attention of the people in that city.

The EverHot Heater Company, manufacturers of EverHot and Par-X Automatic Water Heaters, is an extensive user of gas in the manufacture of the component parts of the heater and through the cooperation of the Detroit City Gas Company, their products—EverHot and Par-X Heaters—were displayed in the main office and branches of the utility.

Philadelphia Company Celebrates Fiftieth Anniversary

One of the oldest public utility corporations of the holding company type has just celebrated fifty years of successful existence here in Pittsburgh. Interesting ceremonies participated in by the employe body of more than 8,000 marked the event. More than 60 per cent of the employes have been with the organization upwards of ten years; 25 per cent upwards of twenty years. This corporation, oddly enough is known as the "Philadelphia Company," although it has nothing to do with the city of that name.

A feature of the celebration was the honoring of sixteen retired employes who had served with the organization, or its predecessors, more than half a century ago, and of E. E. Omohundro, who after fifty years service, is still filling a responsible position with the company. Highlights of the company's development were dramatized and broadcast in a special descriptive radio program.

Approve Richmond Rate Schedule

The Board of Aldermen and City Council of the City of Richmond, Va., have approved a new schedule of gas rates for the Department of Public Utilities.

These rates were proposed to hold and increase the heating load and industrial load.

Apply for Budget Expense Approval

The Code Authority for the Cooking and Heating Appliance Manufacturing Industry has made application to the Administrator for approval of its budget for, and of the basis of contribution by members of the Industry to, the expense of administering the Code for the period from June 15, 1934, to June 15, 1935.

The total amount of said budget for the said period is $44,975.00. The basis of contribution is as follows:

A contribution by all members of the Industry of from 1/15th of one per cent to 1/5th of one per cent of their net sales in 1933. These contributions to be made in installments of 1/15th of one per cent each, the first installment becoming due on June 15, 1934, and two other installments to be levied when and if necessary. The maximum contribution for any one company shall be $4,000.

Holders Name 6 Executives to Utility Board

Six new directors were elected to the board of Commonwealth and Southern Corporation at the recent annual meeting of stockholders in Wilmington, Del. The new directors are operating heads of leading subsidiaries of the corporation and have been recognized as leaders in utility corporations for many years. The by-laws of the corporation also were amended eliminating the office of the chairman of the board.

Wendell L. Willkie, president, declared after the meeting that the "election to the board of the chief operating executives of the six larger operating units of the Commonwealth and Southern system is another step in the established policy of the corporation to unify more completely its functions and operations."

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The "Defender"

A LOVEKIN EMERGENCY GAS SHUT-OFF VALVE designed to prevent the possibility of explosions and resultant damages on all types of

Automatic
Gas Water Heaters

Embodying the Patented Lovekin Principle of actuation upon the softening of a Fuse (similar to that used in the well-known Automatic Fire Sprinkler Systems), these Valves are designed for protection against dangerous overheating. The Fusible Element is enclosed in a cartridge, which not only "protects" the Fuse from contact with the water or other conditions which might affect its operation, but permits proper and easy re-servicing.

The general principle of operation is very simple; i. e., when the water is overheated to a danger point, the Fuse softens, causing the Gas Valve to snap shut.

Approved by many Gas Companies
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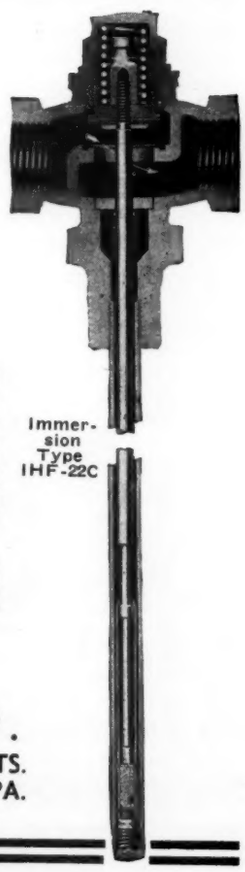


Immersion Type IHF-22C

KITSON CO.
WESTMORELAND & STOKLEY STS.
PHILADELPHIA PA.
Address Dept. "G"

Personals

B. F. Pickard has resigned as vice-president of the Oklahoma Natural Gas Co., Tulsa, Okla., to succeed **C. E. Dove** as general manager of the Central States Power & Light Corp., Tulsa.

J. F. Owens, president of the Oklahoma Gas & Electric Co., has been elected a director of the United States Chamber of Commerce.

Thomas N. McCarter, president of the Public Service Corp. of New Jersey, was elected president of the Edison Electric Institute at its annual convention in Atlantic City. He succeeds **George B. Cortelyou,** president of the Consolidated Gas Co. of New York and affiliated gas and electric companies.

Mr. McCarter has been an active member of the American Gas Association since its inception. He has served as director for many years and as member of a number of important committees, particularly those relating to tax matters. He is the donor of the McCarter Medals which are awarded annually for resuscitation in asphyxiation cases.

The Institute also reappointed as vice-president, **W. J. Hagenah**, of the Standard Gas & Electric Co., **Paul M. Downing,** of the Pacific Gas & Electric Co., and **A. H. Kehoe** of the New York Edison Co. **J. G. Holtzclaw** of the Virginia Electric & Power Co. was newly appointed a vice-president of the Institute. **Edward Reynolds, Jr.,** is to continue as treasurer, **Bernard F. Weadock** as vice-president and managing director and **H. S. Bennison** as assistant managing director.

C. W. Twitchell, chief special agent of the Los Angeles Gas & Electric Corporation was elected vice president of the Chief Special Agents Association, Inc., an organization composed of chief special agents of Southern California public utilities.

Harold R. Sterrett, vice-president and general manager of the New Haven Gas Light Company, New Haven, Conn., recently tendered his resignation as local federal emergency relief administrator.

Mr. Sterrett was chosen as chairman of the local CWA committee last November because of his experience as chairman of the Citizens Committee on Employment, founded by Mayor Thomas A. Tully in 1931, which continued in existence until March, 1932, when the City's direct works funds were exhausted. When the CWA was merged with the FERA last month, Mr. Sterrett sought to be released, but consented to stay until the FERA committee had effected the transfer and affairs were running smoothly.

H. L. Gruehn recently resigned as assistant budget manager, The United Gas Improvement Company, Philadelphia, Pa., to become Assistant Secretary and Assistant Treasurer of the Consolidated Gas, Electric Light and Power Company of Baltimore.

He had been an employee of U. G. I. since April, 1927, and had devoted his time to the various problems engaging the attention of the Operating Department.

During his association with the utility industry Mr. Gruehn has won two first prizes and two second prizes in the H. M. Byllesby competition for the best paper submitted yearly on the value of the accountant to the electric industry.

He received a certified public accountant's commission in Maryland in 1926.

G. W. Harr, of Fairmont, W. Va., succeeds F. F. Schauer, of Pittsburgh, as president of The Pennsylvania Natural Gas Men's Association, it was announced recently following a meeting of directors. Harr is manager of the gas department of the Monongahela-West Penn Public Service Company and Schauer is vice president of the Equitable Gas Company.

H. H. Phillips, secretary of The T. W. Phillips Gas and Oil Company, Butler, was elected vice president, and **B. H. Smyers, Jr.,** attorney for the Equitable Gas Company, was re-elected secretary treasurer.

Directors in addition to the above are: T. B. Gregory, vice president, Columbia Gas and Electric Company; S. W. Meals, president, The Carnegie Natural Gas Company; B. D. Phillips, vice president, T. W. Phillips Gas & Oil Company; F. R. Phillips, president, The Philadelphia Company; George W. Ratcliffe, president, The Manufacturers Light & Heat Company; J. French Robinson, vice president, The Peoples Natural Gas Company. Mr. Schauer; J. B. Tonkin, president, The Peoples Natural Gas Company; George E. Welker, president, The United Natural Gas Company, and George Wittmer, Jr., treasurer, The American Natural Gas Company.

E. K. Smith formerly assistant foreman of the West Texas district pipe line department of Lone Star Gas Co., Dallas, Texas, has been made foreman. Mr. Smith succeeds Felix E. Byrne, who has left the company.

Claude D. Lawrence was recently appointed to the position of assistant sales manager of the New England Power Engineering & Service Corporation.

Mr. Lawrence was born and raised in the Empire State. He was graduated from Cornell University in 1923 with a degree in Mechanical Engineering. After a brief association with the Scranton Electric Company in Pennsylvania he was engaged for a period of five years in power sales work with the Central Hudson Gas and Electric Company with headquarters at Poughkeepsie and Newburgh, N. Y.

He joined the New England Power Engineering & Service Corp. on April 15, 1929, as personal assistant to Sales Manager H. Rocktaschel.

John H. Hubbs was recently appointed as purchasing agent of The United Gas Improvement Company, Philadelphia, Pa.

Having served as assistant purchasing agent of the company for a number of years, and with his intimate knowledge of materials and markets, he is eminently fitted for his well-deserved promotion.

TRADE NEWS

New Roots-Connersville Bulletin

Single-stage centrifugal blowers and exhausters are described in bulletin 120-B10, just published by Roots-Connersville Blowers Corp., Connersville, Ind. While the bulletin referred to covers only the single-stage units, the company also manufactures a complete line of multi-stage equipment.

A table lists capacities up to 8000 CFM at pressures up to 3 lbs., but information regarding larger capacities and higher pressures is readily available upon request.

Type "OI" blowers have the impeller mounted directly upon the extended electric motor or steam turbine shaft. In the Type "OIB" blowers, each unit has its own shaft and bearings, adapting them to coupled, geared, or belted drives, and making this type blower especially suited to heavy duty service.

Type "A" machines have the double inlet arrangement, which is just as important in the handling of gas or air as in the handling of liquids, according to the manufacturers.

All types have throttling or damper valves in the inlet, to regulate the volume of air.

L. S. Hamaker Promoted

L. S. Hamaker, Sales Promotion Manager of Republic Steel Corporation, Youngstown, Ohio, has been advanced to the position of Vice-President and General Manager of The Berger Manufacturing Company, Canton, Ohio, wholly owned subsidiary of Republic. The appointment was effective June 1.

Mr. Hamaker began his career in the steel industry in the sales department of The Berger Manufacturing Co. and later was made Advertising Manager. During a series of mergers he became Advertising Manager of United Alloy Steel Co., Central Alloy Steel Corp., and finally of Republic Steel Corp., when that organization was formed. He was appointed Sales Promotion Manager of Republic in 1931.

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

METER REPAIR PARTS

FOR

ALL MAKES - ALL SIZES OF METERS

LARGEST GAS COMPANIES NOW USING OUR PARTS

SEND FOR OUR CIRCULAR ON METER REPAIR PARTS

SAMPLES AND PRICES GLADLY SENT

— o —

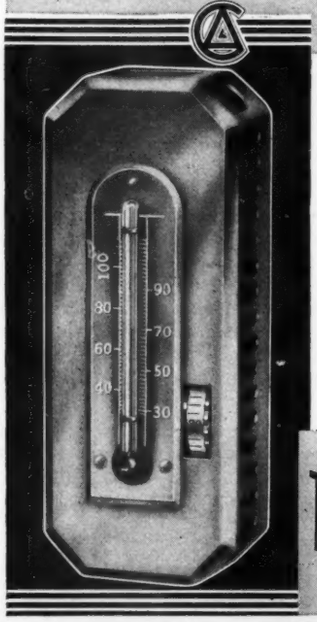
LAMBERT METER CO.

BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

DETROIT LUBRICATOR COMPANY

ASSURES AUTOMATIC PRECISION CONTROL IN ALL "GENUINE DETROIT" PRODUCTS

by



THE EXCLUSIVE USE OF "CHACE" BIMETAL

Where automatic control of temperature is the aim; or where automatic control actuated by temperature changes, is desired, use Chace Thermostatic Bimetal as the active element of your control. Sold in:

SHEETS • STRIPS • FORMS

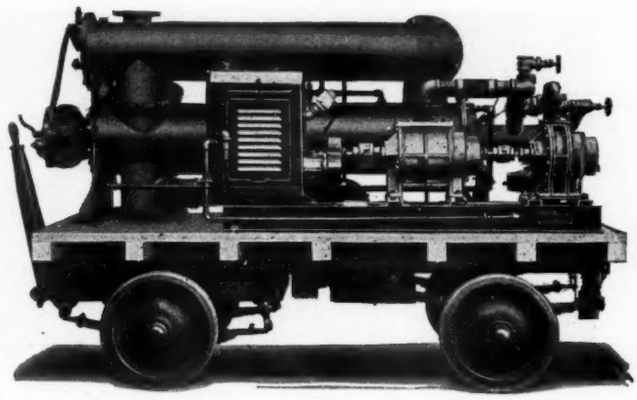
CHACE THERMOSTATIC BIMETAL

"It Bends with the Heat"

W. M. CHACE VALVE CO.

1610 Beard Avenue . . . Detroit, Mich.

QUICKER PURGING AT LOWER COST



IMPROVED ROOTS-CONNERSVILLE HARRISON INERT GAS MACHINE

SINCE the introduction of Harrison Inert Gas Machines about two years ago, these units have found application in many leading gas works.

Built to produce inert gas containing less than 1% oxygen, and zero percent carbon monoxide, these units are economical to operate, and furnish an ample supply of inerts at low cost. Harrison Inert Gas Machines have been built in sizes ranging from 7500 to 40,000 cubic feet per hour, at 2 lbs. pressure; but other sizes and pressures can be arranged. Both portable and stationary types are available, driven by gasoline engines or electric motors, with either gas or oil burners.

Improvements include placing the cooling chamber in a horizontal position, thus reducing overall height to a minimum. Other refinements have been made, resulting in a simpler and more efficient unit.

Our sales engineers will welcome the privilege of studying your requirements and making recommendations.

Write for Bulletin 100-B10

Roots CONNERSVILLE

BLOWER CORPORATION

12th & Columbia -- CONNERSVILLE, IND.

BLOWER BUILDERS SINCE 1854

Rudy Holds Largest Dealer Clinic

Seventy-three heating and air conditioning dealers of the Rudy Furnace Co., Dowagiac, Mich., completed June 5th the largest engineering and sales clinic ever held at the Company's plants.

Called primarily for its Indiana representatives, the clinic attracted dealers from Illinois, Michigan, Ohio and Kentucky as well. It was the second clinic of the year for the Company, the first having been held in Appleton, Wis., for representatives in that area.

Under the direction of Thomas Torr, member of the American Society of Heating & Ventilating Engineers, and the Company's chief engineer, the meeting discussed and received training in the theory of heat, the figuring of both gravity and forced air, in the use of a new forced air installation system developed by the company and in the practical scope of "attic exhaust cooling." Under the direction of the Company's sales and advertising department, the meeting covered such points as retailing heating and air conditioning, humidity, automatic controls, and the use of new sales methods.

Jack Stowell, of Aurora, Ill., member of the National Code Authority for the Roofing & Sheet Metal Contracting Industry, which covers warm air heating and air conditioning, and A. F. Frazee, Rudy general manager and member of the Code Authority of the Warm Air Furnace Manufacturers, discussed and explained their respective codes.

Bryant Acquires Silica Gel and Silica Gel Patents For Use in the Air Conditioning Industry

The Bryant Heater Company, Cleveland, Ohio, has acquired exclusive rights to Silica Gel and all Silica Gel equipment patents for comfort air conditioning.

This step is the result of extensive research and analysis of air conditioning needs and requirements which have disclosed the fact that if it is practical and economical to remove the excess moisture from air, then only a small reduction in dry bulb temperature is necessary to give the proper feeling of comfort. Further, that air conditioned in this manner avoids the sensation of chill or dampness that often otherwise prevails in the space involved. In other words, satisfactory comfort air conditioning means more emphasis on humidity control and less on temperature control.

Over a period of ten years, Silica Gel equipment has been developed and successfully operated in a wide range of industries where it was necessary to reduce the moisture content of the air, —either where the air was used for process purposes, or where certain operations were performed under a controlled atmosphere condition.

Successful, also, have been a number of Silica Gel installations of air conditioning systems in office and public buildings, restaurants, homes, etc., where the primary purpose was to insure the comfort and health of the occupants.

The above principle has been incorporated in air conditioning equipment which includes both room cabinet units as well as central plants.

General Refractories Appoints Hopkins Sales Manager at Cleveland

Mr. John C. Hopkins has been appointed district sales manager of the Cleveland, Ohio, office of General Refractories Company, Philadelphia.

He was formerly associated with the Central furnace division of the American Steel & Wire Company, Cleveland, and has held various posts at all of the company's blast furnace plants.

Mr. Hopkins' new headquarters are in the Leader Building. James P. Raugh is associated with the same office.

Jas. P. Marsh Corp. Takes Over Berwyn Regulator Co.

Jas. P. Marsh Corporation, 2073 Southport Avenue, Chicago, Illinois, manufacturers of heating equipment and industrial instruments, announce the acquisition of the business of the Berwyn Regulator Company, Berwyn, Illinois, manufacturers of the Tritrol Heat Regulator.

Production of the Tritrol line of regulators has been transferred to the Marsh plant at 2073 Southport Avenue, Chicago, Illinois, and the sale of the product will be handled through the regular Marsh sales organization, along with Marsh heating specialties and steam specialties.

Mr. Henry T. Kucera, inventor of the Tritrol Regulator, has been retained by Jas. P. Marsh Corporation in an engineering capacity.

745 Ranges Sold by Properties in Magic Chef Campaign

The Magic Chef range campaign in The Gas Service Company which lasted four weeks and closed on June 4 was the most outstanding range sale the company has had in a number of years, when the fact that the campaign lasted only one month is considered. A total of 745 ranges were sold during the campaign which started on May 7. Two hundred forty-nine ranges were sold in the last week of the sale.

Immediately following the close of the Magic Chef campaign another range campaign was started. In this sale Detroit Jewel ranges will be featured and this activity is scheduled to last for one month.

PURIFYING MATERIAL — BAGGED, OR IN BULK
Manufacturers of GOVERNORS, APPARATUS and EQUIPMENT
IRON Connelly Iron Sponge and Governor Co. SPONGE
Elizabeth, N.J.
Chicago
1876 [USE THE BENEFIT of 58 YEARS EXPERIENCE] 1934

AMERICAN GAS JOURNAL

Established 1859

AUGUST 1934

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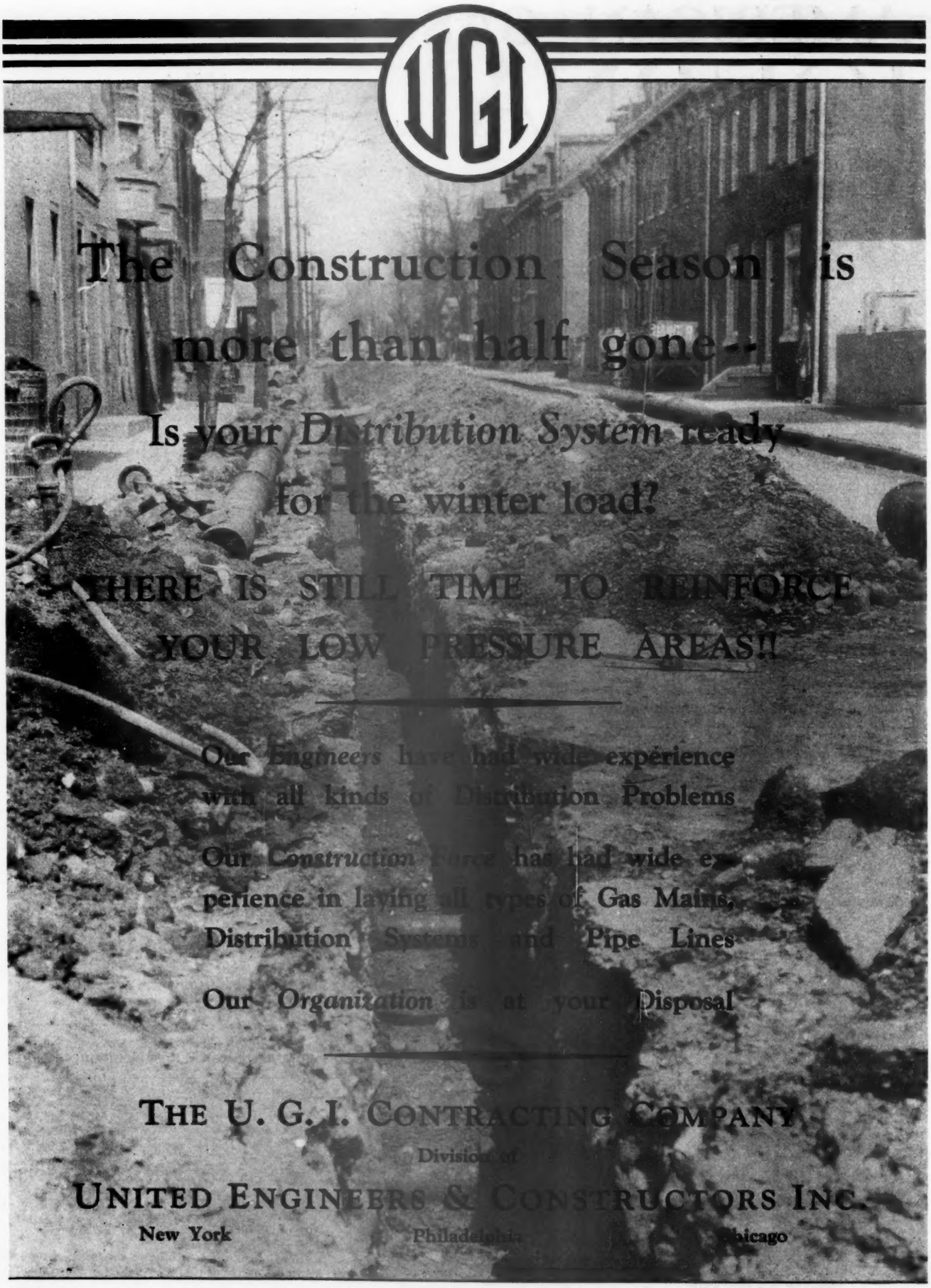
UGI
The Construction Season is more than half gone--
Is your Distribution System ready for the winter load?
THERE IS STILL TIME TO REINFORCE YOUR LOW PRESSURE AREAS!!
Our Engineers have had wide experience with all kinds of Distribution Problems
Our Construction Force has had wide experience in laying all types of Gas Mains, Distribution Systems and Pipe Lines
Our Organization is at your Disposal
THE U. G. I. CONTRACTING COMPANY
Division of
UNITED ENGINEERS & CONSTRUCTORS INC.
New York
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MAXIMUM RETURN TO CLIENTS PER DOLLAR EXPENDED

They Say . . . Opinions and Comments

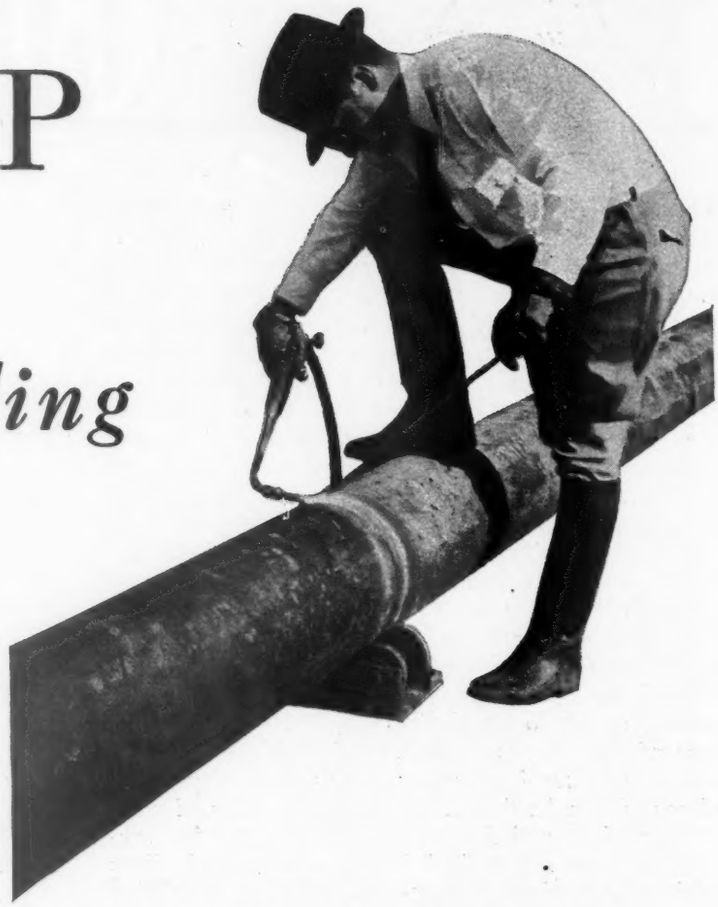
YES AND NO with emphasis on the long-term YES just about summarizes the business acumen contained in the letter recently addressed to stockholders and employees of the Brooklyn Union Gas Company by its president, James H. Jourdan. The communication served in part as an advance index to the currently released financial statement which shows increased operating expenses, including the New York City excise levy and higher real estate taxes, and also that the added income from sales is nullified by revenues held in suspense because of proposed lower rates. In fact, this five per cent reduction in rates is one of the most important stumbling blocks holding up a forthright declaration of better net earnings. And, until the matter is settled, using Mr. Jourdan's words: "Net earnings from now until the end of the present rate litigation must be reported in two ways, viz: earnings if Commission rate order is confirmed; and earnings if present rate is to remain in force." However, in the face of the over-fed mongrel of UNCERTAINTY who is nipping from many angles these days, and, after giving a frank and detailed explanation of present conditions and future outlook, Mr. Jourdan succeeds, at least for us, in injecting a between-the-lines spirit of optimism, a long-term solidified conviction that, no matter what temporary discouragements, the gas industry is a mighty sound business. And we wouldn't be a bit surprised if this YES for the future were backed up surprisingly soon by concrete facts. Near the end of his message, Mr. Jourdan touches upon a subject of timely interest with these expressions: "The Company welcomes regulation if it be wise and fair. Undue and diversified regulation will strangle enterprise and retard, if not destroy, development."

THAT REGULATION as far as general business enterprise is concerned, no doubt will, in the final analysis, be governed by the same fundamentals which have demonstrated their efficacy in the history of regulation of public utilities, is inferred by Floyd L. Carlisle, leading figure in the Consolidated Gas Company of New York and the Niagara Hudson Power Corporation. After pointing out that "regulation inevitably results in fixing prices" without insuring realization of such prices, he clinches his argument with expression of the fact that the law of supply and demand is the great regulator back of all regulation; and goes on to cite an instance in the gas business in which he brings out the situation of our industry being forced to meet open competition in the process of its own development. In discussing the question of regulation in respect to its interference with management, Mr. Carlisle recalls the time when "fact finding was the primary object sought" in contrast to the present practice of commissions initiating, prosecuting and judging rate proceedings, saying that "this problem will become of enormous importance if regulation is extended to all business enterprises," and if "extended too far, it will kill individual initiative and so straight-jacket management that it can barely function." Voicing a desire for open-mindedness, frankness and candor, and labeling "blind resentment" as "foolish", Mr. Carlisle sums up his opinion: "The object of governments should be to promote the best in our social life and to aid the best in our industrial and agricultural enterprises. I counsel patience and cooperation."

IT IS interesting and helpful at times to look into neighboring fields to test our true perspective. Thus, in abstracts from the reply to the Splawn Report given before the House Interstate Commerce Committee by Walter S. Gifford, president of American Telephone and Telegraph Company, we find some pertinently meaty expressions which could well be utilized by the gas industry in exploiting the TRUTH as against the tirades of certain self-seeking puppet politicians. Mr. Gifford displays the fact that the crying need now "is the revival of long-time investment of private capital in industry," which can be obtained "only on condition —that their confidence is not shaken by unsound legislation and the threat of undue interference in the management of the business on the part of The Government." The good old-fashioned 'hoss-sense' contained in the thought "that the best-governed community is not the one where the police are the most active, make the most arrests, and interfere with the freedom of action of the people" makes powerful ammunition to combat a lot of the 'scare copy' which has been propagated merely for the purpose of self-aggrandizement and believed by many people because they were in the psychological mood to believe anything. Back to Mr. Gifford's analogy: "The police should have full knowledge of what is taking place with respect to obedience to law, and should be efficient, but law-abiding citizens should be subjected to the minimum of police control and interference. The principles are no different in the matter of governmental regulation of public utilities." In our opinion, advertisement of the true meaning and purpose of public regulation, in the case of justified monopolies, placed before the nation in ABC fashion, would speed up the awakening from the lethargy of doubt and uncertainty, which has been prolonged by hypos of vile untruths.

"WE ORDER EVERYTHING FOR PIPE LINE WELDING FROM LINDE"

UP and UP *go Lindewelding Savings*



LINDEWELDING ten miles of 10-in. pipe was a small job for this company, which employs some of the best Lindewelders in the country. But Linde Process Service could *still* be of help.

Linde Service men showed them the latest Lindewelding technique. Where it formerly required 13 minutes per weld, it now takes less than ten. Similar savings were made in material costs. This additional efficiency was not gained through improvement in manual skill—but through use of the latest developments in Lindewelding.

Linde Process Service was able to boost the construction profit on this already well-organized pipe line. Progressive "pipe-liners" who, like this company, buy *everything for pipe line welding from Linde*, can depend on Linde Process Service to bring them the latest and best pipe-line welding methods, and to help organize welding operations for the greatest speed, soundness and profit.

With developments taking place from day to day, you may be losing money by not taking advantage of Linde Process Service. The nearest Linde Sales Office has the latest information on Lindewelding practices and will gladly show how you can profit by it.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

126 Producing Plants UCC 627 Warehouse Stocks

IN CANADA, DOMINION OXYGEN CO., LTD., TORONTO

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES • UNION CARBIDE

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Users of products and processes developed by Units of Union Carbide and Carbon Corporation benefit from a most unique coordination of scientific research with manufacturing, sales and service facilities. You are cordially invited to visit this summer the numerous exhibits sponsored by the Corporation in both the Basic and Applied Science sections in the Hall of Science at Chicago's 1934 A Century of Progress Exposition.

Sales Offices:

Atlanta	Houston	Portland, Ore.
Baltimore	Indianapolis	St. Louis
Birmingham	Kansas City	Salt Lake City
Boston	Los Angeles	San Francisco
Buffalo	Memphis	Seattle
Butte	Milwaukee	Spokane
Chicago	Minneapolis	Tulsa
Cleveland	New Orleans	
Dallas	New York	
Denver	Philadelphia	
Detroit	Phoenix	
El Paso	Pittsburgh	

NRA

AMERICAN GAS JOURNAL
August
1934

Bring Gas Heating To The Man On The Street... with window displays

Effective Method Used to Advise Public of New House Heating Rates

By
STUART BRATESMAN
Manager, Display Department, Boston Consolidated Gas Company

"SUMMER is hardly the time of year to be talking about gas heating," is the average person's reaction when you mention the activity. The argument invariably comes up that most people are fed up with the past winter's heating worries and want to forget the furnace for awhile. Now, this is just the frame of mind that I think a person should be in when approached on gas heating. People will welcome any service, within their means, that will greatly lessen the heating burden for next year, and many years to come. Some gas companies overlook this fact and concentrate on the winter months for heating. The spring and summer months are, to me, the "happy hunting grounds" for the alert company, in heating sales promotion activities.

One very effective medium for getting the gas-house heating story to the public, in general, is your windows. You'd be surprised to know the actual number of people who pass your office over the course of an average business day. These people represent a cross-section of the thousands of consumers on your lines. There should be an interesting group of colorful window displays in your windows to attract and hold their attention. Are there?

More and more gas companies are reducing their house heating rates, so that now the cost of heating the average home with gas is really on a competitive basis with other fuels. This fact is a grand sales ally. You know it, but does the public? Tell every passerby the story—with window displays. Play it up big in each advertisement. You can't say enough about it, as there are always some people who are unaware of the actual reduction.

Accompanying this article are three heating window displays used by an eastern gas company to announce the new low heating rate to its con-

"Sally, did you hear the great news about gas house heating?"
"Yes, the new low gas rate certainly reduces the cost... Jim always raved about it and now we're going to have it."
GAS HEATING
IS NOW WITHIN THE REACH OF EVERY AVERAGE FAMILY

about producing effective window display material. All it takes is a little imagination and foresight on the part of the gas company, in the form of a budget covering the activity, and someone to create the ideas and execute the displays themselves. It is well within the reach of every average gas company to install a paying display department. The returns from the activity will more than make up for the original expenditure. Ask any gas official who uses modern window display advertising.

Reach the man on the street with your gas heating displays. Remember, window advertising costs very little to prepare, compared to other advertising media, and the results more than justify the initial expense.

sumers, and any persons interested in the subject. You'll notice that they take their places, in sequence, as a complete series, starting with the plain announcement of the new rate. The following displays varied the theme of people expressing opinions about the new rate and how it affects their heating problems.

In all of these displays, the big theme that was stressed is the fact that this new low rate makes it possible for the man of moderate means to now receive the benefits of gas heating. It brings this effortless heat to the "shirt-sleeve" class. Before, it was always considered a rich man's luxury. Tell the public this—explain to each reader, via your window displays, that this form of heating can now be theirs, for the asking.

There's really nothing mystifying

sure!... I USE GAS HEAT
"I FIND GAS HEATING MOST SATISFACTORY AND IT'S VERY ECONOMICAL TOO. WITH THE NEW LOW GAS HEATING RATE EVERY HOME SHOULD HAVE IT"

Today's Housewife Needs To Be Engineer; N. Y. U. Course Will Teach Her How

THE housewife of today needs to be an engineer as well as an economist, chemist, mechanic, psychologist, interior decorator, and jack-of-all-trades, according to Dr. Freda J. G. Winning, of the department of home-economics and home-making at the School of Education of New York University.

So many new kitchen and household gadgets which made their appearance during the boom times are now beginning to get jittery in their cotter pins that the home-economics department is inaugurating next semester a regular course to teach students the intricacies of household equipment.

"Study will be made of the underlying principles of the mechanism of household appliances," the catalogue description of the course states laconically, and then lists some of the items which will have their underlying principles dissected. They include meters, flues, gas ranges and thermostatic controls, mechanical refrigerators, water heaters, air conditioners, house pipes and some of the more complicated coffee pots and electrical table appliances.

Even china, glass ware, and cooking utensils will be thoroughly analyzed and field trips will be made to several factories in New Jersey and Long Island so that the students can get an idea of how they are made. After that, the theory goes, the students will be better equipped to select and care for these household tools.

Each student in the course will be required to plan the kitchen of her dreams, once it is established that home economics students and home makers dream about kitchens. The students will be given a free rein in this part of the course—just told to let their imaginations run riot—and they will be permitted to include as many appliances as they can ever hope to have or as they can get on their drawing pad.

After that they will be brought down to earth and will be required to construct plans of their present homes, and taught how to improve them by rearranging the existing equipment.

High Pressure Gas Storage

The Author Gives Details Concerning the Installation, Operation and Economies Effected in Storage of Gas Under High Pressure

By DISTRIBUTION ENGINEER

THE use of high pressure storage followed the adoption of high pressure for distribution primarily because of economical initial expenditures and operating costs.

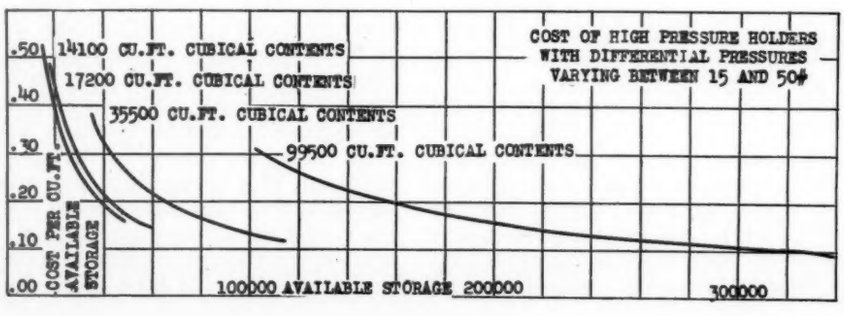
Comparison of actual installation costs of both low and high pressure holders under widely varying climatical, geographical and topographical conditions indicates a lesser capital investment for available storage quantities on high pressure types up to one million cubic feet, and under favorable conditions up to two million. However, on high pressure storage it is impractical to erect single units in excess of 100,000 to 125,000 cubic feet displacement because of milling and construction difficulties. The maximum available gas quantities stored depend on the highest pressures allowable in a given storage unit. The largest high pressure units contain approximately 500,000 cubic feet of available storage. When greater storage quantities are required two or more units are erected although the most common practice is to erect one unit and defer additional installations until absolutely necessary as increment installation provides the greatest economy. A common practice with high pressure storage is to install the smallest practical size of storage tank then add increments as needed which policy is advantageous considering that in the majority of instances the lowest cost per thousand feet of available storage does not always occur with the erection of the largest capacity holder. For instance a 60 ft. diameter sphere may result in a cost of $275 per thousand cubic feet of available storage while one of the 50 ft. diameter may cost only $250 and a sphere of 43 ft. diameter $280.

To determine the most economical size considernig only initial investment it is necessary to secule costs on different sizes with the varying maximum pressures of each size The same detail of costs is often secured on both spherical and cylindrical types as neither of the types is consistently less in initial costs.

Placing the detail costs on a graph facilitates selecting the size and type having the lowest initial cost. The two axes are usually made to represent the cost per cubic foot and the quantity both based on the available storage.

The tentative studies are made on the steel costs alone, eliminating such items as foundations, controls, connections, grading, landscaping and painting. Securing of such additional costs would require voluminous detailing and estimating. Approximate erected steel costs may be secured from manufacturers and approach final bids with sufficient accuracy to produce the desired result on plotted curves or comparative studies.

Long term economy is determined by studying the effect of increment installations. The size as indicated by the above mentioned comparative study of erected steel costs may then be taken as the basis for comparison with smaller sized units at a higher initial investment per unit of capacity



but duplicated in the future. It may be found when considering carrying charges and financing costs that the placing of the smaller sized units in increments may be less costly over a long period of years then the quantity which may be installed at the lowest initial cost per unit of capacity.

Comparing costs per unit of capacity of high pressure holders is difficult due to a lack of standardized capacity terms. Three general designations of capacity are used: cubical contents, available storage and total quantity. Total quantity is the amount which can be stored between zero pounds gauge and the maximum pressure for which the holder is designed. Designation of size based on total quantity follows low pressure practice but does not consider the changed conditions under which low and high pressure holders operate.

Available storage is the quantity stored between the minimum pressure allowable on the distribution system at the storage controls and the maximum pressure for which the holder is designed to operate. Available storage includes the greatest number of operating factors, therefore, most nearly approaches actual working conditions and expresses real costs when used as the basis for costs although either of the other terms may be used for comparative purposes.

Cubical contents is the volume of the gas space within the holder.

Most manufacturers usually supply unit capacity costs based on the total quantity as it produces the lowest figure per unit of storage. Cubical contents would produce the highest cost per unit of capacity. When costs are secured in terms of a unit of capacity the basis should be stated.

Reasons for High Pressure Storage

Experience has indicated numerous reasons for the use of high rather than low pressure storage and with more general use additional advantages will be found. A common reason for high pressure storage is poor pressure on a distribution system which may be caused by mechanical difficulties with compressors or with their prime movers, electric suspensions where prime movers are electrically driven, inadequacy of power generators to provide sufficient power to prime movers, especially during peak hours, lack of compressor capacity for peak hours and other difficulties occurring within a compressing or gas manufacturing plant supplying a system. On natural gas systems the number of wells usually allows for temporary discontinuance of one or more without affect on the compressor supply. These difficulties may be summarized as those occuring at the source of supply which temporarily result in an inadequacy of quantity being furnished to the whole system and require the use of reserve supplies maintained in outlying storage.

Cause of Poor Pressure

A transmission line may also be the cause of poor pressure by being inadequate to provide for peak loads, by requiring repairs, being shut off to install additional equipment or new take-offs, etc. Modern transmission lines have been found to be particularly free from defects causing breaks or leakage and as a result storage is seldom determined on the basis of complete transmission line failure. However, storage at or near distribution systems provides a supply during temporary interruptions of flow along the transmission line and if adequate may be used to feed back along the transmission line thus assisting in or maintaining a supply for other distribution systems having no or inadequate storage.

The reasons so far given for providing high pressure storage are those affecting a continuous supply of gas at sufficient pressure to provide proper service. The possibility or difficulties occuring and the duration of service interruption are impossible to accurately predict. Many of the interruptions are controllable and may be planned for a time when discontinuance of flow would not inconvenience consumers and would require only small quantities of storage. Prolonged accidental interruptions are rare and while every incident given as a reason for interruptions is based on actual experiences the combination of all reasons occurring simultaneously or in groups is unknown on any one system. Individual judgment as to the importance for and quantity of storage required for continuous service during the unusual interruptions has often resulted in large capital investment most of which is never operated through lack of necessity. Because of both engineering improvements minimizing the possibility of interruptions and the ever increasing competition with other fuels not operating under the handicap of a proverbial perpetual supply at the consumers instant command, the investment for storage to provide for the extraordinary should be eliminated or at least minimized.

Economies in the use of high pressure storage generally result from: the use of automatic controls; eliminating the need for re-compressing; lack of necessity for continuous attendance; less maintenance; lack of moving parts; being noiseless and odorless in operation; lack of heating or sealing costs. Reasons for high pressure storage other than direct economic advantages are its neat appearance; ease of landscaping; flexibility as to size, type, locations and arrangement; construction of units in small increments as needed; suitability for available sites and adaptability to future conditions is important considering that numerous small low pressure holders installed only ten to twenty years ago have become obsolete and must be abandoned; whereas had the same investment been made in high pressure storage it would still be functioning and contributing its share of storage capacity.

Maximum Pressure

A frequent reason for high pressure storage has been the necessity for gradually increasing the pressure at compressors until their maximum is reached as to pressure but not capacity. Storage when first installed allows the maximum pressure carried at the compressors to be decreased and again the process of gradually increasing pressures at the compressors is repeated as the demand increases and storage repeatedly added until the limit of quantity capacity of the compressors is reached. The addition of storage rather than compressors is advantageous in providing an adequate supply of gas at points remote from the compressors where it would be of value should temporary discontinuance of the transmission line be necessary.

Under certain plant operating conditions on small systems and on large systems during periods of considerable unused available storage operating savings result by using the storage to carry the load during certain intervals each day and shutting down compressors but storage installed for this purpose alone is seldom an economy when the system is considered as a unit especially when the transmission line is long, unless labor at a plant can be minimized to a watchman during one shift. Some saving is also obtained when the storage and transmission line are of sufficient size to allow compressors to operate at full load.

The improvement of load factor

on both compressors and transmission lines by storage often postpones or eliminates the need for more costly investment in additional compressors or transmission mains.

The effect of remote storage on the average compressor and transmission line load factors is difficult to predict over a period of years. The lower operating costs due to an improved load factor should, therefore, be reorganized as an advantage but its expression in monetary terms is ordinarily too variable and problematical to be included in an estimate.

With the advent of extremely long natural gas transmission mains the load factor is of vital importance. Contracts are drawn up with clauses making it beneficial for the receiving company to maintain as uniform a rate of receiving gas as possible. The amount of storage necessary to provide for uniform receipt is greater than the quantity necessary on the average system as the storage must provide for equalizing over several days in place of only a few hours of each day.

A more unique reason for high pressure storage is to provide service on distribution systems and transmission mains during the period of each opening or lifting of bridges on which the transmission main rests. The main in this case must be parted during each bridge opening requiring a complete interruption of flow.

High pressure storage is beneficial in providing a more uniform B.T.U. contest at the outlet than the inlet due to the natural mixing in a holder. This reason occurs when exceptionally close control is necessary in supplying industrial burners. At various locations different types of gases are mixed and controlled with the assistance of high pressure storage.

There has been some use of high pressure storage for the conservation of natural gas but in the large quantities necessary storage can ordinarily be more economically provided by using depleted natural gas fields where the storage quantities are almost indefinite and under proper conditions the losses are slight. While storage results in various operating economies it is in itself non-revenue producing and, therefore, should be installed in as small quantities as possible with as frequent increments as economy warrants.

Methods of Operation

The simplest method of operation in use is connecting the sphere directly to the distribution system and installing a check valve on the transmission main ahead of both the storage and distribution systems. This arrangement, diagramed in illustration number three allows gas to flow into the storage or distribution system whenever they are lower in pressure than the transmission line.

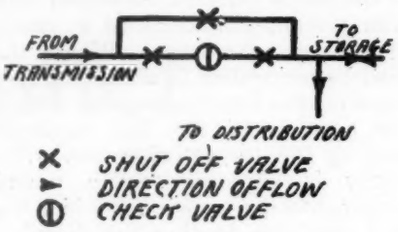


Figure 3

The cost of both installation and operation is low but there are the disadvantages of a high maximum and large variation of pressure on the distribution system. The distribution system is subjected to a variation in pressure from the maximum pressure carried on the transmission line to the minimum to which the storage drops. Providing for no controls between the storage and distribution system is termed "floating" the storage on the distribution system. The pressure on the transmission must not exceed the maximum for which the holder is designed.

The elimination of the check valve so that the storage floats on both the transmission and distribution system is so seldom used it will not be considered. The greatest disadvantage in this case is the considerable loss of stored gas to the transmission system whenever the pressure in the transmission system drops below that of the storage. When a check valve is installed it is common practice to place a by-pass around the check

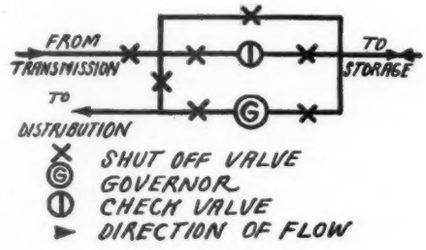


Figure 4

valve for manually controlling flow from the storage into the transmission line and feeding the storage during repairs or examination of the check valve. The by-pass arrangement requires valves on both sides of and adjacent to the check valve for isolating it during repair. Some companies because of local conditions such as lack of space do not provide a by-pass but the cost of the by-pass is a minute factor in the total storage and control investment, being of small size and short length compared with other connections for on a number 6" check valve the by-passes are only two inches in diameter. The by-pass size is determined by the quantity it will feed and because of its short length a small size will provide large quantities in a short period.

The maximum pressure carried on the transmission may be higher than desired on distribution systems which leads to the third step in the development of storage control which is using a governor to regulate the pressures on the distribution system as diagramed in illustration four. This method of control requires the installation of a governor whose inlet is fed from the storage and the outlet connected to the distribution. Valves are usually installed to allow the governor being inspected or repaired without interrupting flow of gas in any desired direction. The check valve with its by-pass is installed as previously mentioned. It is desirable to install a by-pass direct from the transmission main to the outlet of the line regulator to provide for feeding the distribution system with the line regulator out of service. This by-pass is similar in size to that around the check valve, and needs to be but little larger than the orifice on the line regulator as due to its short length adequate quantities will be provided. Except during off peak hours the line regulator would be out of service only under such unusual conditions as a diaphragm tearing. Placing valves as shown in illustration four allows gas to be fed from either storage or transmission line to the distribution when the governor is out of service.

This control system is one of the most common in use but together with the type shown in illustration three possesses the disadvantage of providing no automatic feed into the transmission line from the storage should such be desirable and also all gas fed into the distribution system is taken from the storage until the pressure in the storage is below that of the transmission line. Ordinarily the pressure on the transmission line will decrease during the morning hours but seldom returns to its maximum until late at night. When the transmission line pressure decreases below that in the storage the gas is fed from the storage into the distribution system. As the transmission and storage pressures gradually decrease during the morning hours considerable storage is lost and it is seldom possible to regain this loss until after the final peak period of demand

during the day. A slight gain in storage may be possible between the noon and evening peak loads but usually the facilities of a transmission line are only sufficient for average demands. With the loss of storage during the early part of each day there is not the reserve to provide for the peak hours that would be available if stored gas were conserved by feeding the distribution from the transmission during all periods that the transmission capacity was sufficient. If the loss of available stored gas is sufficient to bring the storage pressure down to the minimum distribution pressure the total demand during the remainder of the day must be supplied directly from the transmission line and should a peak demand occur during this period the transmission line may be taxed beyond its capacity.

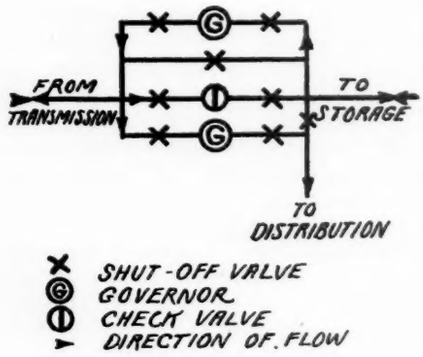


Figure 5

The fourth method of control as diagrammed in illustration five provides fully automatic regulation to both transmission and distribution systems and also can be used to conserve the storage by feeding the distribution line regulator direct from the transmission line. This method requires the usual check valve but also two line regulators. The by-pass around the check valve also serves as a by-pass around the line regulator feeding into the transmission system and a second by-pass is provided to feed from the storage into the distribution system and may be used to act as a by-pass direct from transmission into distribution.

This fourth method of control is advantageous at or near the end of transmission lines when the maintenance of low transmission line pressures will not be detrimental to other territories. Where this system is used on controls near the compressor end of a transmission line the design is usually modified so that the line regulator feeding into the distribution system is fed direct from the storage rather than the transmission system. If the distribution line regulator is fed direct from the transmission line the line regulator feeding back along the transmission line is set to open at the lowest pressure consistent with transmission conditions as a means of conserving storage. Where the distribution system is at the end of a transmission line the pressure setting for opening of the line regulator feeding the transmission line ordinarily is approximately a pound higher than the pressure at which the line regulator feeding the distribution system open to allow for a pressure drop through the governor provided such a practice would not affect other nearby distribution systems where there may be none or inadequate storage.

Preliminary to estimates for additional storage a careful study is usually made of the method of control on each distribution system and the pressures at which line regulators are set to open as often a slight altering of the controls or pressures in one or more districts will result in an improved load factor on the transmission line and increased use of storage. Storage is expensive and every effort ought to be made to use available storage to its maximum.

Because of transmission line or compressor load factors it is often desirable to fill the storage at certain hours or during the periods when the pressure on the transmission line is above a predetermined minimum. An electrically operated clock controlled valve is sometimes used for time control but more often it is used in conjunction with the check valve on any of the methods outlined. Retaining the check valve precludes the possibility of gas flowing from storage to transmission line should difficulties cause the pressure on the transmission line to be lower than the storage during the period when the clock controlled valve is open. The use of solenoid operated valves which will return to a closed position with an interruption of current have not ordinarily proved reliable on the sizes necessary with gas controls. Motor operated valves will remain in the position occuring at the moment of current failure. Should current failure occur with the valve open gas may continue to flow into storage after the time planned and lower the transmission line pressures at an undesirable period.

The disadvantages of electrical controls at unattended stations are the effect of power interruptions, low voltage and mechanical failure. Electric controls may be actuated by pressure conditions instead of time clocks if desirable and have the advantage of allowing the valve to open only when pressure conditions are proper regardless of whether time schedules of pressures are maintained.

The clock controlling the opening and closing of the storage feed valve may be of the type which permits two or more settings for various days of the week the object being to allow feeding into the storage at least twice a day on week days and possibly only once on Sundays or vice versa depending on the local conditions.

Electrical Interruption

The few installations using solenoid controlled valves are installed so that during any electrical interruption valves automatically assume an open position the idea being that with a prolonged interruption it would be more desirable to have the transmission line feeding the storage whenever higher in pressure than to have the distribution system consume all available storage and have no direct connection from the transmission line. There is also the advantage that the drop in transmission pressures will be noticable at the compressing station or in other districts and an investigation soon disclose the cause. When the control station is located conveniently near a location where employees are continuously in attendance alarm systems should be installed to give warning of power outages.

A type of valve such as a line regulator directly actuated by pressures rather than indirectly through electrical controls is more reliable for unattended stations. The line regulator actuated only by pressure operates on the supposition that whenever the transmission pressures are above that for which the governor is set to open, gas may be taken from the transmission line without affecting the transmission system as a whole or any of the nearby distribution systems. With experience, a load dispatcher soon becomes familiar with the repeated coincidence of time and pressures at control stations such as storage locations and, therefore, can use pressure to actuate controls as accurately as and more consistently than electrically controlled time actuated valves installed at the control station.

On natural gas systems the pressure on transmission lines is occasionally if not always above the

(Continued on page 37)

Building Customer Goodwill

By ADDISON B. DAY

President and General Manager, Los Angeles Gas and Electric Company

HE would be rash indeed who would offer a formula purporting to solve the goodwill problem of the public utility in all its forms or under all conditions. Customers relations are human relations at wholesale and human natures and human outlooks are as various as are the numbers on the census roll. There is no magic formula, except in the most general sense. But one general statement can with safety be made—the good repute of a public utility is the constant responsibility of every person connected with its payroll.

The golden rule of customer relations might possibly be expressed something like this: There are just two things to keep in mind regarding customer relations. First, give the customer a square deal. Second, see that the customer knows he is receiving a square deal. All the rest is detail. The public utility square deal may be defined as rendering service of standard quality at reasonable rates, with courtesy.

The relations of a public utility with its customers are complicated because of the very nature of the business. The intangible character of public utility service, such as gas and electric service, presents a very serious difficulty. The purchaser cannot visualize the quantity or the value of the public utility's service as he can see and appreciate the things he buys from a retail store. Merchandise can be evaluated from the standpoint of quantity, quality, and suitability for the purpose. On the contrary, public utility service is something needed throughout the month, and the user has no adequate picture of what it represents in value. At the end of the month, a box of mystery, known as a meter, is read, and from its outgivings a bill is rendered. Here we have the makings of misunderstanding; intangibility, mystery, and lack of acquaintance with the people who are rendering the service and the bill. On top of this, add the fact that the service is practically compulsory; the utility is a monopoly.

GOLDEN RULE OF CUSTOMER RELATIONS

1. **Give the customer a square deal.**
2. **See that the customer knows he is receiving a square deal.**

Having this consideration of potential misunderstanding in mind, it is clear that the very foundation of customer relations lies within the utility itself in the formulation of policies and the training of employees, not only to do a good job of public service, but also to overcome the natural misunderstandings of the business.

Customer and employee goodwill are so closely related that in our organization the cultivation of both groups is the function of a single department. Our Personnel Department includes these activities: advertising, supervision of the memberships of employees in outside associations (such as chambers of commerce, civic clubs, service clubs, etc.), employment, and employee education. The department does not attempt to operate by setting up a staff of specialists within itself to do everything that ought to be done, but rather is a coordinating agency to secure the interest, cooperation, and active support of all department heads and employees to a general program of goodwill.

Two-Sided Program

There are two phases to our goodwill program—an external phase and an internal phase. The external phase has to do with such matters as service and commercial policies, publicity, and employee contact. Without going into detail as to the contents of the term "service and commercial policies," let it suffice it to say that, like all other well-managed utilities, we believe that all policies should be directed to the purpose of securing a square deal for the three parties at interest—the public, the employee, and the investor. We cannot unduly favor any one member of this trinity without injustice to the other two.

By far the most difficult item to control in our program of customer relations is that of the contact of the members of our organization with the public itself. We participate in civic affairs, as citizens and according to our several inclinations and abilities, from the President down.

Reprinted from Executives Service Bulletin, Metropolitan Life Insurance Company, July, 1934.

And of course there are the usual public contracts by the million every year in the course of rendering gas and electric service. These contracts call a trained personnel, if they are to be beneficial to the utility. And because of the importance and magnitude of this job, by far the larger share of our customer relations effort is devoted to the training of the members of our own household, not only in the things that are usually called "public relations," but also in those matters which might be considered strictly internal matters.

Square Deal for Employee

The basis of any program of good employee relations must necessarily be a square deal for the employee himself. Fair treatment, in the measurable relationships, such as hours, wages, and economic benefits, must be supplemented by fair treatment in the intangibles. The attitude and bearing of officials toward subordinates; the interest shown by the management in those matters of employee welfare not strictly within the responsibility of management; that intangible something that men feel but cannot define—all enter into the composition of employee relationship. Partly to secure this frame of mind, and probably in part because of it, a number of agencies of employee culture and goodwill have been established.

The President's Round Table

Once each month, except during the summer vacation, the principal executives and department heads of the company meet at dinner with the President. On these occasions, stated programs provide for the discussion of intimate matters of policy and management. But incidentally, and perhaps quite as important as the discussions, there has developed a spirit of goodwill and good fellowship among all those included, and between them and the President.

If in any organization there are interdepartmental misunderstandings and jealousies, it is pretty safe to say that they originate at the top, rather than down along the line. Thorough acquaintance and ripening friendship tend to eliminate such misunderstandings and jealousies; and it is probably true that our organization is as free from such disorders as any that may be found.

The Employees' Association

For the past eight years, a strong Employees' Association, managed entirely by employees, has furnished outlet and direction for the social, recreational, and educational impulses and ambitions of our people. The Association is doing remarkable educational work. The evening school has furnished study opportunities to increasing numbers each year. During the fall semester each past, there were 798 enrolled, and the spring enrollment is much above that figure.

Creating Spirit of Unity

Recreational and social activities of all kinds are promoted by the Association for the benefit of its members. One of the chief values of the Association is the opportunity it has afforded for employees from different departments to work together in a common cause. This has broken down interdepartmental barriers and feelings, and has created a spirit of unity that would have been difficult to produce by other means. The Association serves another important purpose in furnishing the opportunity for administrative and executive training which does not exist in most routine jobs. In this way the true worth of great numbers of employees has been brought to the attention of department heads and those responsible for advancement and promotion.

The Old Guard

The Old Guard in our organization is an honorary group of those who have been in the company's service for ten years or longer. It is mentioned in this connection more as an indication of internal conditions than because of its importance in any customer relations function. The significant fact in this relationship is that 33 per cent of the entire employee body of our company is included in the Old Guard. This figure is an index of the loyalty of our employees.

Institute of Management

Every person on our staff who has a subordinate, from the President down to the lowliest assistant foreman, is included in what we call the Institute of Management. The Institute of Management exists for the discussion of those intimate problems of human relations and company policy and practice that require to be ventilated in any organization. Occasionally the Institute of Management meets for such discussions, but normally they are carried on through a mimeographed publication of limited circulation, "The Baton," mailed to members of the Institute in their departments.

Research Society

With the development of our educational program, our evening school turned out hundreds of students who had completed a course in public speaking. The Research Society was the natural outgrowth of this condition. The Society is a public speakers' organization, in which the subjects for discussion usually are those of public utility interest. This group has been a veritable drill ground in public utility practices and economics for an increasing number of those who have acquired public speaking ability and wish to prepare for more serious platform work.

Uniform Pension and Benefit Plan

In recognition of the increasing dependence of the employee upon the employer for some measure of economic security in times of stress and adversity, as well as in the days of his productivity, we, in conjunction with our affiliates, have installed a beneficial system under the name of Uniform Pension and Benefit Plan. This provides, through an insurance carrier, benefits for extended disability, death benefits, and a retirement pension. The employees contribute a part of the cost of the retirement pension; the disability benefit and the life insurance are purchased by the company. The effect of this provision on the morale of the organization has been beneficial.

Courtesy Training

Courtesy is a difficult art under the conditions that surround the public utility. All the resources of the contact employee are necessary in order that he may retain or win the goodwill of the customer. We therefore have frequent recourse to courtesy training, in which not only the personal element of courtesy is considered, but also the more or less technical phases which enable the individual to say and do graciously those things which accord with company policy. Conferences, addresses and discussions are used.

The customer relations problem is one which ultimately depends upon the giving of the square deal. This applies both as to the public and as to the employee body. The attempt to do too much for any group is as bad as the attempt to do too little. To accord just deserts is no small accomplishment; and it is the foundation and framework of good customer relations.

Formulas For Designing Natural Gas Pipe-Line Systems Consisting Of Parallel Lines[1]

By T. W. JOHNSON[2] and W. B. BERWALD[3]

THE United States Bureau of Mines, in cooperation with the Natural Gas Department of the American Gas Association, has been studying actively for the past several years the flow of natural gas through high-pressure pipe lines.[4] This report deals with that part of the study involving the design of pipe-line systems, consisting of lines laid parallel to each other. The lines are referred to as the original line and the parallel line. The paralleling line may or may not extend the entire length of the original line; however, the parallel line is connected at its two ends to the original line.

As a result of the large expansion of the natural-gas industry, almost all markets within economic distance from the developed gas field have at least one pipe line supplying them with natural gas. Small increases in the consumers' demand for natural

gas can be met usually by increasing operating pressures, but any marked increase in demand necessitates paralleling sections of the existing systems. It is believed that to a large extent future expansion in the natural-gas industry will consist of paralleling the present lines. The several formulas given in this report have been developed to aid in the design of such systems. Curves and tables were prepared from these formulas to simplify the calculations materially and to facilitate determination of the sizes of pipe to be used in paralleling various diameter lines to give the most economical design. The formulas are presented without detailed derivations, as a complete report on the flow of natural gas through pipe lines is being prepared, which will contain the derivations of these formulas. Examples included here show the detail of application of the several formulas to problems of design of parallel lines.

Acknowledgments

The general study of the flow of natural gas through pipe lines was made under the supervision of H. C. Fowler, former acting chief engineer, and R. A. Cattell, chief engineer, Petroleum and Natural Gas Division, Bureau of Mines, and of N. A. C. Smith, supervising engineer, Bureau of Mines Petroleum Experiment Station, Bartlesville, Okla.

The study of the flow of natural gas through pipe lines was made in cooperation with the pipe-line flow committee, Natural Gas Department, American Gas Association. The members of this committee are: H. D. Hancock, H. L. Doherty & Co., chairman; G. H. Baird, Cities Service Gas Co.; E. F. Schmidt, Lone Star Gas Co.; R. W. Hendee, Oklahoma Natural Gas Corporation; E. A. Clark, Columbia Gas Co., Pittsburgh, Pa.; T. R. Weymouth, Columbia Gas and Electric Corporation, New York, and E. L. Rawlins, Bureau of Mines.

Special thanks are due to E. L. Rawlins, Bureau of Mines, for assistance in deriving the formulas and to G. H. Baird, Cities Service Gas Co., for assistance in presentation of the data. The manuscript was reviewed also by H. P. Rue, E. S. Burnett, Gustav Wade, H. C. Miller, C. P. Bowie, and G. B. Shea of the Bureau of Mines.

Formulas for Parallel Lines

The following formulas for solving problems relating to parallel lines are based on Weymouth's formula for the flow of gas through pipe lines.[5] This formula is:

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[1] *"Reprinted from U. S. Bureau of Mines, Report of Investigations 3241."*

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[3] *Associate petroleum engineer, U. S. Bureau of Mines Petroleum Experiment Station, Bartlesville, Okla.*

[4] *Johnson, T. W., and Berward, W. B., Flow of Natural Gas Through High-Pressure Transmission Lines: Rept. of Investigations 2942, Bureau of Mines, 1929, 18 pp.*

Berwald, W. B., and Johnson, T. W., Factors Influencing Flow of Natural Gas through High-Pressure Transmission Lines: Rept. of Investigations 3153, Bureau of Mines, 1931, 27 pp.

American Gas Association, Pipe-Line Flow Subcommittee report to Main Technical and Research Committee on Investigation of the Flow of Natural Gas in High-Pressure Pipe Lines: Oct. 10, 1932, 420 Lexington Ave., New York.

[5] *Weymouth, Thos. R., Problems in Natural-Gas Engineering: Trans. Am. Soc. Mech. Engr., vol. 34, 1912, pp. 185-231; also see references footnote 4.*

$$Q = 18.062 \frac{T_0}{P_0} \left[\frac{(P_1^2 - P_2^2)^{16/3} d}{GTL} \right]^{1/2},$$

where,

Q = volume, cubic feet per hour at temperature and pressure bases of T_0 and P_0,

T_0 = temperature base, degrees Fahrenheit, absolute,

T = temperature of flowing gas, degrees Fahrenheit, absolute,

P_0 = pressure base, pounds per square inch, absolute,

P_1 = inlet pressure, pounds per square inch, absolute,

P_2 = outlet pressure, pounds per square inch, absolute,

d = internal diameter of pipe, inches,

G = specific gravity of gas (air = 1.00), and

L = length of pipe, miles.

The following formulas are applicable under the conditions that after a section of the original line (or all of it) has been paralleled, the temperature and specific gravity of the gas and the pressures at the inlet and outlet ends of the original line are the same as they were before paralleling.

Throughout the report the following notation is used:

× = portion of length of original line paralleled, expressed decimally,

d = internal diameter of original line, inches,

d_1 = internal diameter of parallel line, inches,

Q = volume of gas flowing through the system, before paralleling, cubic feet per hour at base conditions of pressure and temperature, and

Q_1 = volume of gas flowing through the system after paralleling, cubic feet per hour at base conditions of pressure and temperature.

The following formula is used to determine the portion of the entire length of line of a given diameter that must be paralleled with the same or a different diameter of pipe to increase the volume the desired amount.

$$\times = \frac{\left[\left(\frac{Q}{Q_1} \right)^2 - 1 \right]}{\left(\left\{ \frac{1}{\left[1 + \left(\frac{d_1}{d} \right)^{8/3} \right]^2} \right\} - 1 \right)} \quad \text{.....(1).}$$

Equation (1) may be rearranged to give an equation for the volume flowing through a system for any percentage of length of line paralleled with any diameter pipe.

$$Q_1 = \frac{Q}{\left[\times \left(\left\{ \frac{1}{\left[1 + \left(\frac{d_1}{d} \right)^{8/3} \right]^2} \right\} - 1 \right) + 1 \right]^{1/2}} \quad \text{(2).}$$

Equation (1) may be rearranged also to give an expression for the diameter of the paralleling line that will be required to increase the flow of gas a given amount for a given portion of line paralleled.

$$\frac{d_1}{d} = \left(\left\{ \frac{\times}{\left[\left(\frac{Q}{Q_1} \right)^2 - 1 + \times \right]} \right\}^{1/2} - 1 \right)^{3/8} \quad \text{(3).}$$

When the value of × is 1, or, in other words, when the entire length of the original line has been paralleled, the following relationship may be written,

$$\left[1 + \left(\frac{d_1}{d} \right)^{8/3} \right] \frac{Q_1}{Q} = \text{.....(4).}$$

That is, when the entire length of the line has been paralleled, the ratio of the volume after paralleling to the volume before paralleling is equal to 1 plus the eight-thirds power of the ratio of the diameter of the parallel line to the diameter of the original line.

When the diameters of the original and parallel line are the same, equations (1) and (2) simplify to,

$$\times = \frac{4}{3} \left[1 - \left(\frac{Q}{Q_1} \right)^2 \right] \quad \text{.....(5),}$$

and,

$$\frac{Q_1}{Q} = \frac{2}{(4 - 3\times)^{1/2}} \quad \text{.....(6).}$$

Example Showing Use of Formulas

The following examples are given primarily to show application of equations 1, 2, and 3.

Problem 1: Given a pipe line 75 miles long, internal diameter (I.D.) 19.4 inches, delivering 40,000,000 cubic feet of gas per day. It is desired to increase the delivery to 50,000,000 cubic feet per day by paralleling a section of the line with 17.5-inch I.D. pipe while maintaining the same inlet and outlet pressures on the system. Find the length of the original line that must be paralleled.

Substituting in equation (1),

$$\times = \frac{\left(\frac{40{,}000{,}000}{50{,}000{,}000} \right)^2 - 1}{\left\{ \frac{1}{\left[1 + \left(\frac{17.5}{19.4} \right)^{8/3} \right]^2} \right\} - 1} = \frac{(0.8)^2 - 1}{\left\{ \frac{1}{[1 + 0.7597]^2} \right\} - 1},$$

$$\times = \frac{-0.36}{0.3229 - 1.000} = 0.532.$$

Thus, it is necessary to parallel 53.2 per cent or 39.9 miles of the original 75-mile line, to increase the delivery from 40,000,000 to 50,000,000 cubic feet, using 17.5-inch pipe.

Problem 2: Given a pipe line 50 miles long, internal diameter (I.D.) 12.25 inches, delivering 25,000,000 cubic feet of gas per day. If 20 miles of the length is paralleled with 15.5-inch I.D. pipe and the same inlet and outlet pressures are maintained on the system, find the delivery from the system after the section is paralleled.

Substituting in equation (2),

$$Q_1 = \frac{25{,}000{,}000}{\left[0.4 \left(\left\{ \frac{1}{\left[1 + \left(\frac{15.5}{12.25} \right)^{8/3} \right]^2} \right\} - 1 \right) + 1 \right]^{1/2}}$$

$$= \frac{25{,}000{,}000}{[0.4\{0.1212 - 1.0\} + 1]^{1/2}}$$

$$Q_1 = \frac{25{,}000{,}000}{(-0.3515 + 1.0)^{1/2}}$$

$$= 31{,}044{,}000 \text{ cubic feet.}$$

Thus the delivery is increased to 31,044,000 cubic feet per day, or there is a gain of 24.2 per cent.

Problem 3: Given a pipe line 70 miles long, internal diameter (I.D.) 19.5 inches, delivering 45,000,000 cubic feet of gas per day. It is desired to increase the delivery to 63,000,000 cubic feet per day, or by 40 per cent, by paralleling 42 miles (60 per cent of the length) while maintaining the same inlet and out-

let pressures on the system. Find the required diameter of the parallel line.

Substituting in equation (3),

$$\frac{d_1}{d} = \left(\left\{ \frac{0.6}{\left[\left(\frac{45{,}000{,}000}{63{,}000{,}000} \right)^2 - 1.0 + 0.6 \right]} \right\}^{\frac{1}{2}} - 1 \right)^{\frac{3}{8}} = \left(\left\{ \frac{0.6}{0.5102 - 1.0 + 0.6} \right\}^{\frac{1}{2}} - 1 \right)^{\frac{3}{8}},$$

$$\frac{d_1}{d} = \left(2.3335 - 1.0 \right) = 1.114$$

From which,
$d_1 = 19.5(1.114) = 21.7$ inches, internal diameter of the parallel line.

In the actual design of the line a 22-inch outside-diameter (O.D.) pipe with a wall thick enough to withstand the line pressure with a reasonable safety factor would be used.

Design of Parallel Lines

The percentages of length of line that must be paralleled to give various percentage increases in gas delivery are shown in table 1 for different ratios of the diameter of the parallel line to the diameter of the original line. The curves in figure 1 are plotted from these data and show the nature of the relationship expressed by equations (1), (2), and (3). Some interesting factors and comparisons pertaining to the design of parallel systems are brought out by the equations and by the curves in figure 1.

The preceding formulas for calculating problems in the design of parallel lines eliminate the numerous computations of the "trial-and-error" methods commonly used. Furthermore, a table or a series of curves similar to those in figure 1 (based on the equations presented in this report) will serve the purpose almost as well as calculations made by the formulas and will reduce materially the time required to design parallel lines. For example, in problem 3 the computed internal diameter of the parallel line is a size not regularly manufactured, and in practice a 22-inch outside-diameter (O.D.) pipe of sufficient wall thickness would be selected; another calculation must then be made, using equation (1) with the correct internal diameter of the 22-inch pipe to determine the actual length of the parallel line. The number of calculations in problems of this type would be materially reduced by the use of the curves in figure 1. Another advantage in the use of such a series of curves is that for any immediate increase in gas delivery the length of the parallel line necessary for different $\frac{d_1}{d}$ ratios is obtained readily, and from the $\frac{d_1}{d}$ curves the additional length of the parallel line necessary for estimated future increases in gas demand can be determined with ease.

From equation (3) the minimum portion (expressed decimally) of the length of the original line that must be paralleled for any desired increase in volume equals the arithmetical value of the quantity $\left[\left(\frac{Q}{Q_1} \right)^2 - 1 \right]$ and for this condition the diameter of the parallel line is infinitely large. The column of figures under letter M in table 1 and the curve in figure 1

TABLE 1. - Percentage of length of original line that must be paralleled to give various percentage increases in delivery

Increase in delivery, percent	Values of ratio, $\frac{d_1}{d}$																	
	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	M
1	12.8	7.8	5.4	4.1	3.4	2.9	2.6	2.4	2.3	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	1.97
2	25.3	15.3	10.6	8.1	6.6	5.7	5.2	4.8	4.5	4.4	4.2	4.1	4.1	4.0	4.0	4.0	4.0	3.88
3	37.5	22.6	15.7	12.0	9.8	8.5	7.7	7.1	6.7	6.5	6.3	6.1	6.0	6.0	5.9	5.9	5.8	5.74
4	49.3	29.8	20.6	15.7	12.9	11.2	10.1	9.3	8.8	8.5	8.2	8.1	7.9	7.8	7.8	7.7	7.7	7.55
5	60.6	36.6	25.4	19.4	15.9	13.8	12.4	11.5	10.9	10.4	10.1	9.9	9.8	9.7	9.6	9.5	9.5	9.29
7	82.6	49.9	34.5	26.4	21.6	18.7	16.9	15.6	14.8	14.2	13.8	13.5	13.3	13.2	13.0	13.0	12.9	12.65
10		68.4	47.4	36.2	29.7	25.7	23.1	21.4	20.3	19.5	18.9	18.5	18.3	18.0	17.9	17.8	17.7	17.35
15		96.1	66.6	50.8	41.7	36.1	32.5	30.1	28.5	27.4	26.6	26.1	25.6	25.3	25.1	25.0	24.8	24.38
20			83.5	63.7	52.3	45.2	40.7	37.8	35.7	34.3	33.4	32.7	32.1	31.8	31.5	31.3	31.1	30.56
30				85.1	69.8	60.5	54.4	50.5	47.8	45.9	44.6	43.6	42.9	42.5	42.1	41.8	41.6	40.83
40					83.8	72.5	65.3	60.5	57.3	55.0	53.5	52.3	51.5	50.9	50.5	50.2	49.9	48.98
50					95.0	82.3	74.1	68.6	65.0	62.4	60.6	59.4	58.4	57.8	57.3	56.9	56.6	55.55
60						90.2	81.3	75.3	71.3	68.5	66.5	65.1	64.1	63.4	62.8	62.4	62.1	60.94
70						96.8	87.2	80.8	76.5	73.5	71.4	69.9	68.8	68.0	67.4	67.0	66.6	65.40
80							93.2	85.4	80.9	77.7	75.5	73.9	72.7	71.9	71.3	70.8	70.4	69.13
90							96.4	89.3	84.6	81.3	78.9	77.3	76.1	75.2	74.5	74.0	73.7	72.30
100							100.0	92.7	87.7	84.3	81.9	80.1	78.9	78.0	77.3	76.8	76.4	75.00
120								98.0	92.8	89.2	86.6	84.8	83.5	82.5	81.8	81.2	80.8	79.34
140									96.7	92.9	90.2	88.3	86.9	85.9	85.2	84.6	84.2	82.64
160									99.7	95.8	93.0	91.0	89.6	88.6	87.8	87.3	86.8	85.21
180										98.1	95.2	93.2	91.8	90.7	89.9	89.3	88.9	87.25
200										99.9	97.0	95.0	93.5	92.4	91.6	91.0	90.6	88.89
250												98.1	96.6	95.5	94.7	94.0	93.6	91.84
300													98.6	97.5	96.6	96.0	95.5	93.75
350													100.0	98.8	98.0	97.3	96.9	95.06
400														99.8	98.9	98.3	97.8	96.00
500																99.6	99.1	97.22
600																	99.8	97.96
A	8.7	15.8	25.6	38.6	55.2	75.5	100.0	128.9	162.6	201.3	245.3	294.8	350.2	411.7	479.4	553.8	635.0	

d = internal diameter of original line, ins.; d_1 = internal diameter of parallel line, ins.
M = minimum percentage of length of original line that must be paralleled for given percentage increases in delivery, (at which the value of d_1/d is infinitely large).
A = percentage increase in delivery when entire length of original line has been paralleled, for various d_1/d ratios.

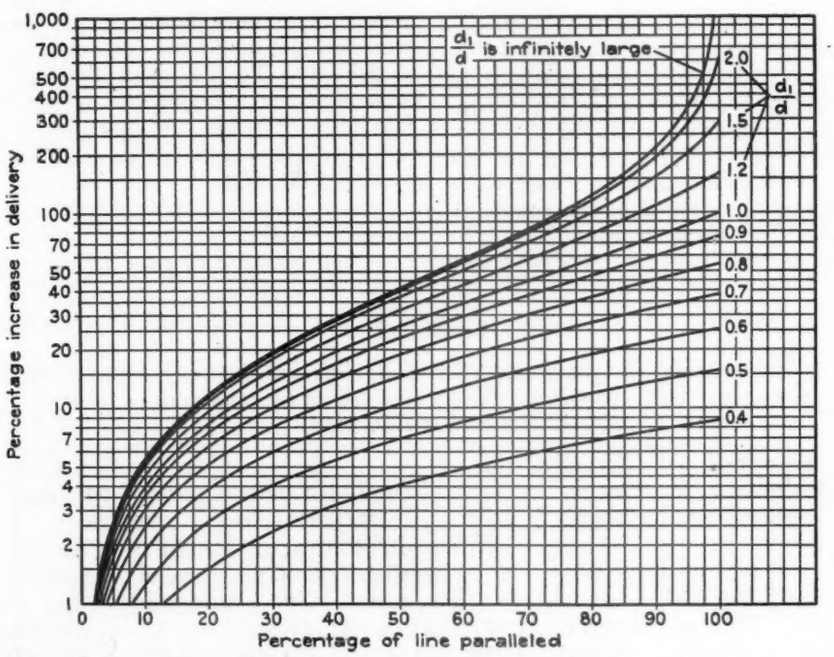


Figure 1.- Relationship between percentage increase in the delivery and percentage of the original line paralleled for different values of $\frac{d_1}{d}$

Note: d_1 = internal diameter of parallel line.
d = " " " original "

for a ratio of $\frac{d_1}{d}$ infinitely large give the minimum percentage of the length that must be paralleled to obtain specific increases in delivery; however, for this condition the diameter of the parallel line is infinitely large. In other words, for real conditions the percentage of the length of the original line that must be paralleled by another line for a specific increase in delivery is greater than the value given under M in table 1 or by the curve in figure 1 for a $\frac{d_1}{d}$ ratio infinitely large.

The figures at the bottom of table 1 following A are the percentage increases in delivery attained by paralleling the entire length of a line for different ratios of internal diameter of parallel line (d_1) to internal diameter of original line (d). Obviously for a $\frac{d_1}{d}$ ratio of 1 (parallel line same diameter pipe as original line) the delivery is increased 100 per cent when the entire length has been paralleled. This same $\frac{d_1}{d}$ ratio requires paralleling of 74.1 per cent of the length of the line to increase the delivery of gas by only 50 per cent.

Economics of Parallel-line System

A group of curves similar to those in figure 1 illustrate the economic advantages of certain types of design in parallel pipe lines. The following discussion and examples bring out some of the factors to be considered.

For the small values of $\frac{d_1}{d}$ (ratio of diameter of parallel line to original line), an increase in the value of $\frac{d_1}{d}$ reduces materially the length of the parallel line required for any desired increase in delivery. However, for increasing values of $\frac{d_1}{d}$ the amount of change in the length of the parallel line, with change in the $\frac{d_1}{d}$ ratio, decreases. For instance, to increase the delivery 10 per cent (see table 1) it is necessary to parallel a 10-inch internal diameter (I.D.) line for 47.4 per cent of its length using 6-inch I.D. pipe $\left(\frac{d_1}{d} = 0.6\right)$, 29.7 per cent of its length using 8-inch I.D. pipe $\left(\frac{d_1}{d} = 0.8\right)$, 18.9 per cent of its length using 14-inch I.D. pipe $\left(\frac{d_1}{d} = 1.4\right)$ and for 16-inch I.D. pipe $\left(\frac{d_1}{d} = 1.6\right)$ the percentage of line parallel decreases to only 18.3; for still larger values of the ratio $\frac{d_1}{d}$ the percentage of the original line required to be paralleled decreases gradually to a minimum value of 17.35, and for this percentage the diameter of the parallel line is infinitely large. In other words, for a 10 per cent increase in delivery of gas a percentage of the length of the original line greater than 17.35 must be paralleled, and if the ratio of the diameter of the parallel line to the diameter of the original line is 2 it is necessary to parallel 17.7 per cent of the length.

The following examples illustrate a method of analysis of the economics of various designs of parallel lines. The costs per mile of different diameter lines employed in the examples are average values and should be used with caution when applied to specific installations. Variations in cost of labor and materials and in topography of the right-of-way preclude any definite cost figures. However, the costs per mile used for different diameter lines are comparable and for the purpose of the following analysis are accurate enough to indicate certain general trends in the economics of the design of parallel lines.

The problem is to determine the cost of increasing the delivery of a pipe line 100 miles long of 15,432 inch I.D. pipe by 20 and 50 per cent, using different-diameter parallel lines. Table 2 shows the length of the parallel line required and its cost, using 22-, 20-, 16-, 12.75-, and 10.75-inch pipe. The general trend (table 2) is a decrease in cost as smaller-diameter lines (necessitating paralleling more of the entire length of the original line) are used. However, for the 20 per cent increase in gas delivery and for the particular cost figures used the cost of the 10.250-inch I.D. parallel line is slightly more than the cost of the project using 12.188- or 15.432-inch I.D. pipe. For the 20 per cent increase in delivery the 16-inch line probably would be the best size to use, since its cost is considerably less than that of the 22- or 20-inch lines and about the same as that of the 12.75- or 10.75-inch line. Furthermore, the 16-inch diameter parallel line has several advantages over the 12.75- and 10.75-inch lines, chiefly in that the shorter length of the 16-inch line that would be required, compared to the length of either of the two smaller sizes, allows more freedom in extending the parallel line to take care of future increases in gas demand. The shorter length of line also has the advantage of lower maintenance expense.

From table 2 the cost of the 50 per cent increase in gas delivery, using the same-diameter parallel lines, is proportionately much less than the cost of 20 per cent increase in delivery. To illustrate, using 22-inch pipe the average cost of each per cent increase for the 20 per cent increase in delivery is

$$\frac{1{,}006{,}800}{20} = \$50{,}340,$$

(Continued to page 36)

TABLE 2

Costs of increasing the gas delivery by using different diameter parallel lines. (Table based on original line 100 miles long and 15.432 inches I.D. pipe)

Diameter of parallel line, inches		Cost of line per mile	$\frac{d_1}{d}$	For 20 per cent increase		For 50 per cent increase	
External	Internal			Length of parallel line, miles	Cost of parallel line	Length of parallel line, miles	Cost of parallel line
22.000	21.250	$30,000	1.377	33.56	$1,006,80	61.00	$1,830,000
20.000	19.378	25,000	1,256	34.90	872,500	63.45	1,586,200
16.000	15,432	20,000	1.000	40.75	815,000	74.08	1,481,600
12.750	12.188	15,000	.79	53.21	798,200	96.74	1,451,100
10.750	10.250	12,000	.664	69.53	834,400		

Building the Househeating Load—Part II*

Pre-Sale Survey and Estimate—An Aid in Keeping Customers Permanently Sold

By CARL B. WYCKOFF

Househeating Department, The Public Service Company of Colorado, Denver, Colorado

IN A load building activity of this nature, gross revenue is the goal sought, and merchandising is a secondary issue necessary to accomplish the desired results. With this thought in view it is, therefore, apparent that the better the job sold, the better chance it has of remaining in permanently.

It would be quite simple to eliminate much pre-sale expense by just selling a duck bill conversion on the theory that the utilization of the heat after being delivered to the burner was up to the user. The initial cost in such cases would be negligible and it is quite possible that a number of jobs could be sold and pushed through in a limited space of time. This was the practice a number of years ago when five dollars was about the maximum amount that a customer expected to pay for househeating equipment. Unfortunately, however, these jobs were very expensive and unsatisfactory to operate and only a limited number could afford to pay the increase in heating costs over competitive fuels that such an installation would entail.

The better and more efficient the job sold the less the increase, if any,

EXHIBIT 5.

REQUEST FOR HOUSE HEATING ESTIMATE

Date ..... Master No. .....

Residence Address ..... No. Rooms .....

Name ..... Res. Tel. No. .....

Business Address ..... Tel. No. .....

Owner ☐ Renter ☐ ..... Fuel Used .....

Heat. Warm Air ☐ Hot Water ☐ Steam ☐ Vapor ☐ Stoves ☐

Remarks: .....

Requested by ..... Terr. of .....

in heating costs and the result is that you have a permanent customer and have really made dependable progress in building the load.

During the depression which has just passed some companies lost as much as fifty per cent of their househeating business while others suffered only minor losses. Of course, some communities were harder hit than others, but still it is a certainty that good jobs will remain in longer than poor ones. It, therefore, behooves one to perfect his organization to such an extent that the job will be laid out on a sound engineering base.

It is realized that a good many companies are not large enough to afford a regular heating engineer so some likely party will have to be trained for the work and it is hoped that this paper will be a help in these cases.

The first move after the prospect's interest has been secured is to fill out a *"Request For Survey"* card shown below as exhibit "5." Of course, this form could be replaced by just a memorandum, but experience proves that regular forms are more satisfactory. A *"Master Card"* is then issued. Both sides of this card are shown in exhibits "6" and "6A." These master cards are numbered and furnish a key for all future references to the individual job. A *"Survey Card,"* (exhibit "7" and "7A") is then issued which bears the same number as the master card. The usual custom then

* PART *I—July 1934 Issue.*

EXHIBIT 6

ADDRESS ..... MASTER No. 20411

NAME .....

TEL. NO. RES. ..... BUS .....

RECORD OF ESTIMATE AND SALE

RECEIVED FROM	RECORD OF SURVEY CARD: ISSUED TO EST. ENGINEERS	RECORD OF SURVEY CARD: RECEIVED FROM EST. ENGINEERS	RECORD OF ESTIMATE SHEET: ISSUED TO REPRESENTATIVE	RECORD OF LEASE: SENT TO ORDER CLERK

RECORD OF JOB INSTALLED RECEIVED EXECUTED "A" ORDER

REMARKS:

SOLD BY:

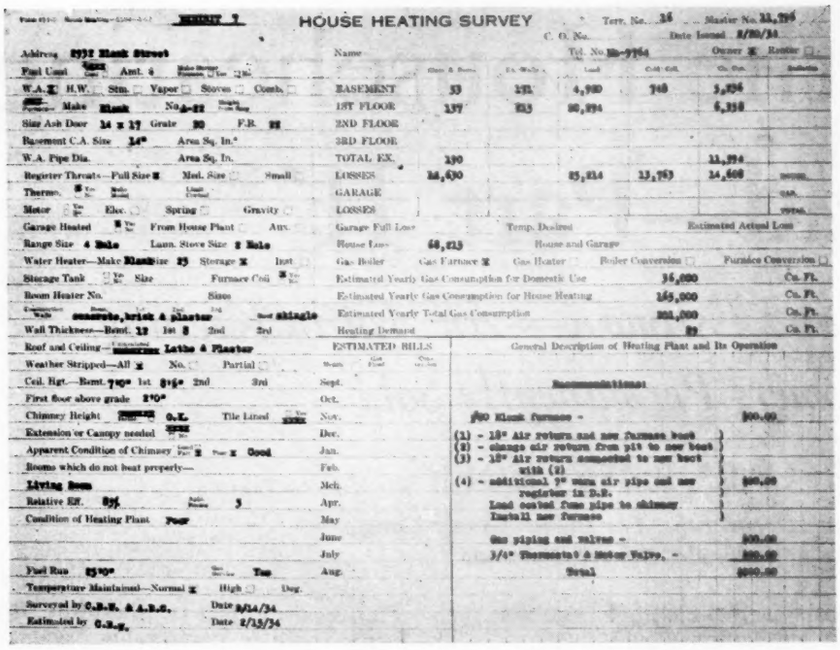
RECORD OF SALE EXHIBIT 6A

CUSTOMER ORDER NO. A ..... LEASE NO. ..... DATE EX. .....

BILLED CUSTOMER ..... DIV ..... FOLIO ..... $ .....

COST TO COMPANY

EQUIPMENT MATERIAL AND LABOR	WORK DONE BY	COST $
	TOTAL	$



HOUSE HEATING SURVEY

Address 2932 Black Street — Name — C. O. No. — Tel. No. Hu-9764 — Date Issued 2/20/34 — Owner X — Renter

Fuel Used Gas — Amt. 6 — Make Heater — Pressure — Type — No.

W.A. X — H.W. — Stm. — Vapor — Stoves — Comb.

Make Black — No. 6-22 — Heating Surface — Fuel Gas

Size Ash Door 14 x 17 — Grate 20 — F.B. 22

Basement C.A. Size 14" — Area Sq. In.*

W.A. Pipe Dia. — Area Sq. In.

Register Throats—Full Size X — Med. Size — Small

Thermo. — Make — Model — Control

Motor — Elec. — Spring — Gravity

Garage Heated — From House Plant — Any

Range Size 4 Hole — Laun. Stove Size 2 Hole

Water Heater—Make Black — Size 25 — Storage X — Inst.

Storage Tank — Size — Furnace Coil — Size

Room Heater No. — Sizes

Construction—Walls concrete, brick & plaster — Roof shingle

Wall Thickness—Bsmt. 12 — 1st 8 — 2nd — 3rd

Roof and Ceiling—Insulation — Lathe & Plaster

Weather Stripped—All X — No. — Partial

Ceil. Hgt.—Bsmt. 7'0" — 1st 8'6" — 2nd — 3rd

First floor above grade 2'0"

Chimney Height — Material O.K. — Tile Lined — Size

Extension or Canopy needed — Size

Apparent Condition of Chimney — Inside X — Outside Good

Rooms which do not heat properly—

Living Room

Relative Eff. 85% — Auto. Heater 5

Condition of Heating Plant Poor

Fuel Run 25'0" — Size — Type Gas

Temperature Maintained—Normal X — High — Deg.

Surveyed by C.B.W. & A.B.S. — Date 2/14/34

Estimated by C.B.W. — Date 2/15/34

	Glass & Doors	Ex. Walls	Loss	Cold Air	Co. Gas	Radiation
BASEMENT	33	172	4,980	740	3,854	
1ST FLOOR	197	213	20,894		6,350	
2ND FLOOR						
3RD FLOOR						
TOTAL EX.	230				11,204	
LOSSES	14,630		25,874	13,763	14,400	
GARAGE						
LOSSES						

Garage Full Loss — Temp. Desired — Estimated Actual Loss

House Loss 68,275 — House and Garage

Gas Boiler — Gas Furnace X — Gas Heater — Boiler Conversion — Furnace Conversion

Estimated Yearly Gas Consumption for Domestic Use 36,000 Cu. Ft.

Estimated Yearly Gas Consumption for House Heating 165,000 Cu. Ft.

Estimated Yearly Total Gas Consumption 201,000 Cu. Ft.

Heating Demand 82 Cu. Ft.

ESTIMATED BILLS

	Gas Fired	Gas Conv.
Sept.		
Oct.		
Nov.		
Dec.		
Jan.		
Feb.		
Mch.		
Apr.		
May		
June		
July		
Aug.		

General Description of Heating Plant and Its Operation

Recommendations

New Black furnace - $90.00

(1) - 18" Air return and new furnace boot
(2) - change air return from pit to new boot
(3) - 18" Air return connected to new boot with (2)
(4) - additional 9" warm air pipe and new register in D.R.
Load cooled fume pipe to chimney
Install new furnace — $40.00

Gas piping and valves - $20.00

3/4" Thermostat & Motor Valve, - $20.00

Total $250.00

Exhibit 7--The reverse side of this card is 7A and gives a complete diagram of the floor plan

is for the sales representative and the estimator to go to the house and get a complete record of the job. These two parties make a good combination. The estimator, while naturally interested in securing the sale, nevertheless, is working on a salary base and is primarily interested in the engineering of the job and an unbiased estimate of the operating costs.

All details are recorded on the face of the survey card and a complete plan of the house is drawn on the reverse side, generally on a scale of two feet to the square. This will answer for the average house. Larger ones will have to be drawn on a smaller scale to get them on the card. All data are completely secured. Windows and doors are measured according to the opening in the wall and can be quickly measured by adding six inches to each dimension, vertical and horizontal, of the sash. Radiators are measured from the bottom of the radiator legs, not including any pedestals upon which they may be set. General conditions are noted like radiator covers, long runs of heat pipes, sharp angles, congested throats, small risers, chimney height as to possible down drafts, etc. The card is then brought to the office and the heat losses, hourly demand, and annual consumption are computed, together with the required amount of radiation, warm and return air pipes. The specifications of the equipment and the improvements recommended are then noted on the face of the survey card (7) as per sample. This sample survey card shows a typical five room equivalent house with a warm air heating plant. It is figured on the base of 6000 degree days, 70° temperature difference, and 1000 B.t.u. natural gas.

A complete set of coefficients of heat transmission through building materials can be secured from the American Gas Association hand book. The factors required for any specific locality can then be computed by simply multiplying the coefficient by the temperature difference anticipated. These data should then be set up in a concise form convenient for ready reference in the estimator's hand book. Few individual localities have use for the complete set so it is not reproduced here.

A chart should be prepared covering the materials commonly used in the particular location. This chart can be made very compact by listing the materials on the horizontal lines of the chart and the wall thicknesses at the head of the vertical lines, the factors appearing in their respective places.

There are many systems in use for simplifying and rapid calculating of house losses but all are based upon these original coefficients which have been accurately determined and universally adopted.

It is true that experience has proven and that quite a number of engineers feel that these coefficients are liberal in actual practice as far as operating costs are concerned. It is equally true that you cannot make a calorimeter out of a house. Estimates, although made theoretically perfect, can vary considerably.

The conclusion, therefore, is for any locality which does not have an experience rating to adhere strictly to the code. As experience is accumulated revisions can be made accordingly if found justifiable.

The writer is willing to go on record as stating that it is unnecessary to consider the basement floors and unexposed basement walls where central heating plants are concerned These items are not considered in the sample survey card previously shown.

Common practice is to base calculations upon a maximum demand based on a temperature ten degrees above the minimum anticipated as these conditions occur only rarely and it is not considered necessary to provide for the extreme.

Estimates on circulating heaters and plants, other than central, are

EXHIBIT 10

Old Style Column Radiators

Height in Inches	Columns 45	38	32	26	23	20	17	14
Sq. Ft. per Section 1	x	3	2½	2	1⅔	1½		
Sq. Ft. per Section 2	5	4	3⅓	2⅔	2⅓	2		
Sq. Ft. per Section 3	6	5	4½	3¾	3	2¼		
Sq. Ft. per Section 4	10	8	6½	5	4	3		
Sq. Ft. per Section 5	(Window Radiators)			—	—	5	4	3

Wall Radiators

13 5/16 × 16 5/8 = 5 Sq. Ft. per Section
13 5/16 × 21 7/8 = 7 Sq. Ft. per Section
13 5/16 × 29 1/16 = 9 Sq. Ft. per Section

American Corto Radiation

Height in Inches	Tubes 38	32	26	23	20	16½	13
Sq. Ft. per Section 3	3½	3	2⅓	2	1¾		
Sq. Ft. per Section 4	4¼	3½	2¾	2½	2¼		
Sq. Ft. per Section 5	5	4⅓	3½	3	2⅔		
Sq. Ft. per Section 6	6	5	4	3½	3		
Sq Ft. per Section 7	—	—	—	—	4¼	3½	2¾

EXHIBIT 11

Glass Areas in Square Feet

	1½	2½	3½	4½	5½	6½	7½
1½	2¼	3¼	5¼	6¾	8¼	9¾	11¼
2½	3¾	6¼	8¾	11¼	13¾	16¼	18¾
3½	5¼	8¾	12¼	15¾	19¼	22¾	26¼
4½	6¾	11¼	15¾	20¼	24¾	29¼	33¾
5½	8¼	13¾	19¼	24¾	30¼	35¾	41¼
6½	9¾	16¼	22¾	29¼	35¾	42¼	48¾
7½	11¼	18¾	26¼	33¾	41¼	48¾	56¼
8½	12¾	21¼	29¾	38¼	46¾	55¼	63¾
9½	14¼	23¾	33¼	42¾	52¼	61¾	71¼
10½	15¾	26¼	36¾	47¼	57¾	68¼	78¾
11½	17¼	28¾	40¼	51¾	63¼	74¾	85¼
12½	18¾	31¼	43¾	56¼	68¾	81¼	93¾
13½	20¼	33¾	47¼	60¾	74¼	87¾	101¼
14½	21¾	36¼	50¾	65¼	79¾	94¼	108¾

EXHIBIT 12

Size	Area	Circumference	Size	Area	Circumference	Size	Area	Circumference
5	19.6	15.75	14	153.9	44.00	23	415.5	74.25
6	28.3	18.80	15	176.7	47.00	24	452.4	75.37
7	38.5	22.00	16	201.1	50.12	25	490.9	78.50
8	50.3	25.12	17	227.0	53.37	26	530.9	81.62
9	63.6	28.25	18	254.5	56.50	27	572.6	84.75
10	78.5	31.37	19	283.5	59.62	28	615.7	87.87
11	95.0	34.50	20	314.2	62.75	29	660.5	91.00
12	113.1	37.62	21	346.4	65.87	30	706.9	94.25
13	132.7	40.50	22	380.1	69.00			

EXHIBIT 13

Hourly House Loss	Annual Consumption M. c. f.			Hourly Demand C. f.			Square Feet Radiation		Square Inches Warm & Cold Air Pipes
1000 Btu's	65%	75%	85%	65%	75%	85%	Hot Water	Steam	
100	317	275	242	171	148	131	667	417	900
101	319	277	244	173	150	132	674	421	910
102	323	280	247	174	151	133	680	425	920
103	326	282	249	176	153	135	687	430	930
104	329	285	252	178	154	136	692	434	939
105	332	288	256	180	156	137	700	438	946

anyone's guess, and one should not commit himself too strongly on estimating operating costs or services rendered where several rooms are to be heated from one unit. The results will depend upon each individual instance. Some are successful and some are not.

For further convenience three additional charts are shown here:

Chart "10"—Square feet of heating surface of various radiators.

Chart "11"—Square feet of glass for odd-sized windows.

Chart "12"—Area of pipes in square inches.

After the house loss has been determined one should have a ready reference before him for the hourly demand and annual consumption, together with the amount of radiation, or warm and cold air pipes required. Exhibit "13" is shown above as a guide. This sample chart is based on a temperature difference of 70 and for a locality having 6000 degree days and 1000 B.t.u. gas. Three columns are shown covering the demand per hour and the annual consumption. These are based on three rates of efficiency; 65%, 75%, and 85%, respectively. A good gas designed warm air furnace will run 85%; a good gas designed boiler 75%; and a good conversion 65%. Of course, these figures will vary, and as it is impossible to give each individual instance an exact rating, the above figures should suffice. It must be remembered that you are furnishing the customer with the proper recommendations to make his job efficient and that if he does not buy the job as you have laid it out, he can expect results accordingly. This point must be impressed upon the customer at the time of the sale.

The season consumption is based on the formula:

$$\frac{\text{House Loss} \times \text{Total Degree Days for the Year} \times 24 \text{ (hours per day)}}{\text{B.t.u. content of gas} \times \text{Efficiency} \times \text{Temperature Difference}}$$

The hourly demand equals:

$$\frac{\text{House Loss}}{\text{B.t.u. content of gas} \times \text{Efficiency} \times .90 \text{ (.90 factor being used to provide pick-up in heating)}}$$

Steam and hot water radiation is based upon 240 and 150 B.t.u. per square foot, respectively. Warm and cold air pipes are based on 111 B.t.u. per square inch. This latter figure applies to first floors only. Second and third floors can be computed on the basis of 167 and 200 B.t.u.'s per square inch, respectively.

The figures for radiation and air pipes apply to the house as a whole, and are based on the standard code which provides for a wind velocity of 15 miles per hour. Under ordinary conditions this heat can be distributed uniformly. Of course, where excess exposure exists in any portion of the house, the heating system can be proportioned accordingly.

A degree day is a term developed for use in computing heat requirements and is based upon a mean temperature of 65 degrees. To make it entirely clear, if a given day has a maximum temperature of 70° and a minimum of 60°, the mean would be 65° and there would be no heat requirements, while if the maximum were 60° and the minimum 50°, the mean would be 55° and there would be 10 degree days. The reason the figure of 65° is used instead of 70°, which is comfortable heat, is because the cooler part of the 24-hour period is at night when we require less heat. Take a day with a mean temperature of 65°; it naturally follows that it would probably be 70° or more in the day time and 60° or cooler at night. The house would not cool off to a point where you would need heat until after you had retired and then you would not want heat. This is explained in detail because the question comes up so much among the laymen.

After the annual consumption has been determined it then becomes necessary to divide this total up among the various months of the heating season, as the customer has a right to be advised as to what he can expect. This will require as many charts as you have meter-reading periods. Of course, if it were possible to read all meters on one day, say the first of the month, this would be simple. This is not possible, so it

EXHIBIT 14

Monthly Consumption of Gas for House Heating Based on Different Yearly Estimates

Total Yearly Gas Consumption Estimate Cu. Ft.	2.00% Sept. 4 Oct. 4	8.00% Oct. 4 Nov. 4	13.40% Nov. 4 Dec. 4	17.50% Dec. 4 Jan. 4	18.30% Jan. 4 Feb. 4	15.50% Feb. 4 Mar. 4	13.00% Mar. 4 Apr. 4	8.30% Apr. 4 May 4	4.00% May 4 June 4
65,000	1,300	5,200	8,710	11,375	11,895	10,075	8,450	5,395	2,600
70,000	1,400	5,600	9,380	12,250	12,810	10,850	9,100	5,810	2,800
75,000	1,500	6,000	10,050	13,125	13,725	11,625	9,750	6,225	3,000
80,000	1,600	6,400	10,720	14,000	14,640	12,400	10,400	6,640	3,200
85,000	1,700	6,800	11,390	14,875	15,555	13,175	11,050	7,055	3,400

becomes necessary to set up a schedule that will comply as nearly as possible. For instance, if a customer's meter is read on the tenth of the month, his expected monthly consumption will not be the same as the one whose meter is read on the first. It therefore becomes necessary to secure the actual average degree days for each day of the year for your specific locality and then set up your schedules accordingly. Exhibit (14) shows a chart in part covering conditions as they exist here in Denver, and can be used as a guide in compiling one for any given condition. The annual or seasonal heating consumption is shown in the left hand column and the monthly consumptions follow to the right. To each monthly consumption must be added the estimated domestic consumption and then the monthly cost computed according to the existing rate. In this computation it must be borne in mind that during the milder months of the heating season there will not be a heavy demand for heat but the pilot light will have to burn, so it is, therefore, a good practice to add the pilot light consumption of approximately 2,000 cubic feet for, say, the months of May and October in a climate having 6000 degree days. Other conditions can be governed accordingly.

After monthly costs are computed they are entered on Exhibit (15) upon the reverse side of which recommendations for improvement are made and the selling cost of the proposed job itemized. These figures give the sales representative definite data to present to his prospective customer. It is then up to his sales ability to sell the customer the best job that he can. If he is unable to sell a gas-designed job, he should endeavor to sell the customer on the proper improvements to make the conversion an efficient one. If there are three air returns needed and only one can be sold then you have done the best that you can. If you have properly created a desire in the customer's heart for gas heat you can readily explain to him just what he has a right to expect in what he is buying. Be thorough and honest on this score and do not let your desire to land the order influence you into making unreasonable promises that cannot be lived up to. Very few homes are heated perfectly, so there is no use to give the idea that the simple substitution of gas in the combustion chamber for other fuels will make a perfect job. The older homes were built before people expected to have the entire house comfortable and most of the newer homes are built to sell and the cost of construction is kept as low as possible. In such cases it seems that the heating plant suffers the worst. The result is that you will have to sell as many improvements as possible. By all means include temperature controls on all jobs and do not overlook aquastats and pressuretrols on boiler jobs. Ceiling insulation and weatherstripping will do much toward making a heating job economical and satisfactory.

People seem satisfied to put up with a great deal in their present heating plants, but as soon as they install gas they expect perfection. So, explain thoroughly and honestly what they are buying and what they can expect, and then use good salesmanship to close the deal.

(Continued in September Issue)

Form 76 HM—2500—3-32 EXHIBIT 15

Master No.

HOUSE HEATING ESTIMATE

Address Type of House Story

Name Phone

Business Address Phone

Terr. of Date

ITEM	SALES PRICE
Gas Boiler Gas Furnace	$
Fuel Run	
Installation	
Conversion Installed	
Thermostat	
Miscellaneous	
Est by	TOTAL

APPROX. METER READING DATE	ESTIMATED GAS BILLS GAS FIRED	CONVERSION
Sept.	$	$
Oct.		
Nov.		
Dec.		
Jan.		
Feb.		
Mar.		
Apr.		
May		
June		
July		
Aug.		
YEARLY TOTAL	$	$

GENERAL INFORMATION: Type Heating Plant Condition; Normal; High; Temp. Desired; Radiation; Warm Air Pipes; Cold Air Pipes; Type Water Htr.; Leak of Fuel Run; Yes ☐ No ☐; Surface Comb. Burner; Fire Bowl ——"; Grate ——"

Estimated Yearly Gas Consumption { Dom. M Cu. Ft. $; H. Htg. M Cu. Ft. $

Htg. Dem. Cu. Ft. | Max. Hr. H.L. B.T.U.

Owner ☐ Renter ☐ Apts. ☐ Rooms ☐

The Company's estimate herewith is based upon average gas heating cost but is not a guarantee.

Hate Utilities—Why?

THE following comments are taken from "The Wedge," house organ of Batten, Barton, Durstine & Osborn, Advertising Agents, New York. It contains suggestions well worth the consideration of the gas utilities.

"In spite of all their mistakes, public utilities are largely responsible for our way of living. They have lifted drudgery from housework. They have brought comfort, leisure and convenience. They have saved eyesight. They have deterred crime by keeping cities lighted. They have done away with hot kitchens, oil lamps, ice boxes, coal furnaces, brooms, spring cleaning, old-fashioned ironing by the kitchen stove, burnt toast and a multitude more of unpleasant labors and troubles which aged women before their time and robbed them of happiness. Utilities have revolutionized industry. They have carried city convenience to farms. Their securities are owned by millions of people. They have served us well.

"So, of course, everyone hates public utilities. . . . .

. . . "What is the origin of this quarrel between the people and the edifice of our prosperity? Why is any demagogue who threatens to tear down that edifice fairly certain to land somewhere in Washington? Why do we hate railroads, utilities, steel, finance and many of our great industries? . . .

. . . "The real trouble is that the people have always been kept in ignorance regarding most utilities, steel and finance, and until recently have been told little about railroads and other basic enterprises. Serving the people, owned by the people, making money for the people, these great forces of our economic life have nevertheless remained aloof from the people.

Reminiscences

Changes in the Uses of Town Gas

By ALFRED E. FORSTALL

Forstall, Robinson & Luqueer

IN the middle eighties lighting was practically the only purpose for which town gas was employed, and even up to the beginning of the twentieth century that was still its most important use. At the earlier period only luminous flame burners were employed, flat flame burners, either batswing or fishtail, for general purposes and Argand burners for reading lamps.

This use of the product was responsible for certain features of manufacturing and distribution practice differing from those now in vogue.

On the manufacturing side, because of the importance of illuminating value and the depreciating effect upon this of the presence in the gas of carbon dioxide the removal of this inert was deemed advisable by many gas company managers, and dry lime purification was almost universal. It was still the practice in Chicago when I went to work there, but because of difficulty in disposing of the spent lime it was decided, in the latter part of 1885, to change over to iron oxide purification and to use a little more cannel coal if it were found necessary to counteract the effect of the carbon dioxide.

Changes in Purification Method

The change-over was started in winter and the iron oxide material was cold when it went into the purifiers. By the end of one or two days the pressure thrown by the first box in series had risen so high that it was necessary to take the box off and refill it. This experience was repeated and the purifying house force had to be increased to handle the many changes required. The cause of the increase in pressure was a purifying material coming out of a box showed it to be uniformly and thoroughly permeated with small crystals of naphthalene which tended to fill the voids in the material and thus obstruct the flow of gas. It was easy to reason that this deposition of naphthalene was due to the low temperature of the purifying material and that the way to overcome the trouble was to heat the large room in which the material was stored and revivified.

Lime was again brought into use while the necessary steam coils were being installed, but after these coils went into action, and the iron oxide material had the chill taken off it before it was put into the boxes, there was no more trouble from excessive pressure in this house which was part of the coal gas plant.

When the manufacturers of carburetted water gas got well under way, however, working without a relief holder resulted in much trouble from excessive back pressure in the first purifier in series in that section of the works. The cause was of course the attempt to pass gas, at the rapid rate at which it was made during the first two or three minutes of the run, through oxide that had become soggy from moisture condensed out of the gas. On one occasion, when the back pressure had reached the point at which a change of boxes seemed necessary, the rise was ended by a sudden drop to slightly below normal. A hurried visit to the purifying room showed that the seals were still intact, but the first box was at once cut out and, when opened, it was found that two holes had been blown through the comparatively thin layer of oxide.

The remedy for this trouble was the use of a layer of planer mill chips under the oxide in each box.

In Newark the change from lime to oxide was not finally made until 1892, although the use of the latter had been experimented with at an earlier date.

Street Pressures

On the distribution side the street pressure was kept low, since luminous flame burners gave the best efficiency with a pressure of about 0.5 in. at the burner orifice. This called for main pressures averaging about 1.5 in. and rarely higher than 3 in. at the outlet of the works governor even at the time of maximum demand. In some systems, where there were sudden and decided changes in elevation, the higher district was supplied from a single point through a governor which cut down the pressure and thus counteracted the effect of the increase in elevation. Such a division into two pressure districts was the practice in Newark for many years.

The time of year and day at which the maximum demand occurred was also affected by the fact that gas was used almost solely for lighting. This use extended to factories, stores and mills and between 5 and 6 P. M. in winter their demand was added to the domestic demand making the send-out during that hour on Mondays to Fridays inclusive much larger than for any other hour during the day. Since the factories and mills closed early on Saturday there was no such peak hour on Saturdays, Sundays or holidays. The evening store lighting kept the total consumption up on Saturdays but was absent on Sundays and holidays.

In a strictly residential town, such as Montclair, N. J., the maximum rate of send-out came about 7 P. M. when the dining-rooms were lighted for dinner and the lights in the other rooms had not been turned down.

Maximum Rate of Send-Out

Apropos of maximum rate of send-out at an unusual hour, at a gathering of managers of gas companies some years ago one of them disclosed that for his company this came at about 2 A. M. He went on to explain that his customers were almost all commercial fishermen who started to go out to their nets about 3 A. M. after breakfast, the preparation of which began an hour earlier.

The largest twenty-four hour send-out during the year invariably came on Christmas Eve, and if the early part of that day was stormy, with a change to clear and colder weather in the late afternoon, thus causing a large part of the Christmas shopping to be put off until evening and compelling the stores to keep open to a late hour, all previous send-out records would be broken.

One year when Christmas came on Monday, giving two successive days of small send-out, I planned to have the holders well down at ten o'clock Saturday evening and thus be able to run through Sunday and Monday without having to suspend any retorts, either coal gas or Wilkinson. The weather conditions on Saturday were such as to give us one of these record send-out and the holders ran down lower than I had intended to have them. Still there was enough gas on hand to carry through all right

but, unfortunately, my "boss" spent the day in Philadelphia and when, on his return, he arrived, early in the evening, at the railroad station near the gas works he decided to visit them before going home. Being of a nervous temperament, he was at once convinced that the town would be out of gas before ten o'clock and when I reached the works, after having had dinner, he gave me a good going over for letting the stock of gas get so low. He was so worried that I felt sorry for him and was glad, for his sake, when the holders began to gain and he felt that it was safe to go home.

Except for this unforeseen episode, my plan worked out as intended and it was not necessary to suspend any retorts over the two days. But having learned how the "boss" felt about a low stock of gas, even when it had been planned for ahead of time, the holders were afterwards kept up without consideration of the expense involved in suspending retorts. What was the use of trying to save money if the means by which it could be done was liable to make the "boss" almost ill through worry?

Electric Competition for Lighting

The development by Edison and others of a commercially feasible system of domestic electric lighting, introduced competition which gas had not been obliged previously to meet. This naturally created a desire for means of increasing the amount of light that could be obtained from the consumption of a cubic foot of gas. As was noted in an earlier installment, this was partly met by the enrichment of coal gas with carburetted water gas of high illuminating value. But the development of the Welsbach incandescent gas light seemed to furnish a more effective and economical means of meeting the competition.

Welsbach Mantle

In either 1885 or 1886 a company was formed in the United States to make and market Welsbach mantles and lights and in the latter year sample lights were distributed among the larger gas companies for test and trial by them. At that time we in Chicago were making a mixed coal and carburetted water gas of about 19 or 20 candle power, and when the lights sent us were tested on the photometer we were greatly disappointed to find that they gave no better results per cubic foot of gas than did good flat flame burners. The tests by other gas companies must have shown the same condition, because none of them took up the use of incandescent gas lights at that time. By 1892, however, the Welsbach mantles had been so much improved that the incandescent gas lights then available did give from three to four times as much light per cubic foot of gas as the flat flame burners. The sale of the lights was taken up by all the progressive gas companies and enabled them to hold their lighting business much longer than could have been done without this means of meeting the electric competition.

Gas For Cooking

But even before the entrance of electricity into the lighting, a start had been made on the sale of gas for cooking. This was regarded as a summer load which utilized plant otherwise idle at that time for the year and many companies established rates for gas used for cooking substantially lower than those charged for gas used for lighting. For instance, if the regular rate was $1.25 per 1000 cub. ft. a price of $1.00 would be made for cooking. This, of course, involved an increase of investment and of commercial expense resulting from having two separate meters for a customer instead of one, but was good policy and the increase in sales per dollar of investment in manufacturing and distributing plant soon made it possible to make the cooking gas price apply to all the gas used and again do all the measuring through one meter.

The sale of gas for cooking was pushed by the exhibition of gas ranges in the commercial offices of the companies and the demonstration of their capabilities by means of "cooking lectures" given by expert women cooks who could also talk well and were available for employment by any gas company for a series of such lectures. Few gas companies had in their own offices sufficient space to seat the audiences at these lectures so, in most cases, it was necessary to "hire a hall" for the purpose. The lectures were really cooking lectures, covering matter that applied to any means of cooking, but the work was, of course, done on gas ranges and the lecturer would make, in an unobtrusive way, references to the greater ease and certainty of operation of gas as compared with solid fuel ranges. Oil was then unknown as a domestic fuel or even as an industrial fuel.

Newspaper space was also used to call attention to the advantages and merits of gas for cooking but the employment of outside salesmen was a later development.

To the effort to sell gas for cooking there was shortly added that to push its use for heating water and by the end of the nineteenth century both of these domestic fields were being actively cultivated.

Gas for House Heating

The subject of the use of gas for house heating and for industrial purposes was actively discussed during the late eighties and early nineties. It was thought that such business could be secured only by means of a gas of lower calorific value than that then being manufactured and the fuel gas proponents were divided into two camps. One of these advocated either a straight producer gas or a mixture containing producer gas while the other felt that no gas containing a large percentage of nitrogen and other inerts could be distributed successfully and argued for either blue water gas or a mixture of coal gas and water gas produced by the complete gasification of bituminous coal and having a calorific value of about 400 b.t.u. per cubic foot. Papers on the subject were read before both the Western and American Gas Light Associations and plants which made and distributed blue water gas were put into operation in Hyde Park, then a suburb but now part of Chicago, and in Jackson, Mich. Neither of these ventures proved profitable and, I think, the companies were finally absorbed by old line companies operating in the same towns.

Under the auspices of the United Gas Improvement Co. apparatus was designed by Walton Clark for the complete gasification of bituminous coal by first carbonizing it in inclined retorts and then discharging the coke directly into water gas generators. The retorts were heated by the blow gases from the generators and the blue water gas was passed through the space above the coal in the retorts to prevent the secondary decomposition of the hydrocarbon vapors and reduce the amount of tar made. A unit of the apparatus on a working scale was built at one of the gas works in Jersey City, but the enthusiasm for a special fuel gas died out and no attempt was ever made to supply gas solely from such a plant.

Later the possibility of the use for house heating of ordinary town gas was investigated. In 1895 Wm. M. Crane & Co., makers of gas cooking and space and water heating appliances, designed a gas fired hot air house furnace and tried to get gas

(Continued on page 38)

Planning for the Future

A Succinct Statement of the Problems Now Facing the Industry and Suggestions for Their Solution

By HILMAR PAPST

Vice President and General Manager, Portland Gas and Coke Company

THE pressure of increased competition has forced the Manufactured Gas Industry to concentrate its energies upon, *First,* Perfection of Gas Supply as regards to Quality and Uniformity of Supply, *Second,* the Kind of Appliances made use of by our Customers, *Third,* Our Service, *Fourth,* Methods of Charging, *Fifth,* Sales Activities, and *Sixth,* Publicity.

All planning for the future should therefore recognize these factors and their significance, in order to more effectively meet the new form of competition and adapt itself to these changing conditions.

Now let us look a little closer at these items:—

Uniform Quality of Gas

Uniform quality and gas supply are the main advantages over other fuels. A uniform supply of gas is particularly necessary in connection with our newer types of thermostatically controlled equipment by reason of the fine and delicate adjustments necessary to satisfactory performance.

Portland Gas & Coke Company has set a standard limit to the variation in pressure of from 4 to 6 inches of water column, and as to the quality of gas in heating value, a range of plus or minus 5 Btu.

The purity of the product, by holding down the organic compounds of sulphur to a minimum, is necessary to wipe out another talking point of our competitors. With proper scrubbing and condensing capacities at the Manufacturing plant, such troubles as gum formation and naphthalene deposits will be eliminated.

Presented at the Northwest Conference Pacific Coast Gas Assn., Portland, Oregon, June 21, 1934.

Kind of Appliances

With reference to the kind of appliances to be made use of by our customers, it is imperative to replace all the old and antiquated equipment by modern appliances in order to quickly establish our customers on a modern basis; but we should also push new appliances as fast as the revival of economic conditions will allow.

Competition with other fuels has made necessary the development of automatic gas appliances; therefore, we should see to it that nothing but automatically controlled equipment is being sold.

Operating companies should pass on to manufacturers any new ideas for appliance improvement as a result of their research, and also ideas for new appliances as the need for same appears to the company.

The performance and particularly the appearance of our modern appliances are certainly helping to shake off the old reputation of times past and are meeting the new competition whose appliances are sold on appearance more than on performance.

With the introduction of automatic features added to gas appliances, such as thermostatic and pressure controls, diaphragm valves, and safety pilots, each of varying designs, the question of servicing customers' appliances should receive more than ever before our closest attention. Maintenance of appliances in good working order is essential. Unsatisfactory appliance performance, whether the fault of the manufacturer's design, or improper installation, or faulty adjustment, under the present-day highly competitive conditions, spells loss of business. Hence, the prime necessity for better servicing manuals, more training, and utilization of laboratories to ascertain the necessary information. All installations, whether industrial or domestic, should be brought up to laboratory standards of condition and scientific technique.

Properly adjusted appliances promote better customer relation, and this expenditure not alone encourages increased customer usage, but also promotes new business. With increased competition it will be necessary, more so than ever before, to maintain free service to our customers, since all sales effort is fruitless unless reinforced by satisfied customers.

At the present time, when gross revenues are decreasing, the tendency naturally is to curtail servicing expense, but on account of the vital necessity of this activity, this expense should not be reduced except where costs cannot be lowered without curtailing such activities. After all, this expense is part of the customer cost, and distributed over all of the customers represents only a few cents per 1000 cubic feet of gas sold.

Our Competition

The present competition from wood, coal, oil, and electricity has shown a decided increase during the last three years, particularly in the domestic field, as the result of sawdust and oil burner campaigns with distressed wood and oil prices, and electric range and waterheater sales campaigns with low promotional electric rates.

The economic life of our business is largely dependent upon the domestic customer, and every effort should therefore be made to hold this class of business by facing our competitors with promotional and competitive rates without sacrificing the premium to which gas service is entitled. The development of promo-

tional and competitive rates is not always a simple matter, particularly where a company in establishing such rates is liable to suffer severe reductions in revenue from present customers. In this connection, the value of a combination rate is apparent. New business is readily taken on at the last step of such a rate, whether represented by additional appliances or by increased usage. On the other hand, when confronted by the loss of existing appliances to competitive fuels, such fuels must also compete with the last step in the combination rates. In other words, an all-gas customer on a combination rate is much less vulnerable to competition as each and every application competes only at the last step of the rate.

Few rate reductions are made with the ultimate possibilities in mind; that is, with full knowledge of the incremental cost of gas service and the lowering of average costs that would result by the additional volume that could be secured by such reduced rates. No doubt such reductions cannot be made all at once; they should be made progressively with the definite objective in mind of finally achieving the rate made possible by the effect of volume on plant facilities and overhead. Most of the hesitancy displayed by the gas industry in establishing rates based on ultimate load has been due to the absence of incremental cost studies based upon ultimate use of facilities and overhead.

Sales Management

Sales activities under the present period of economic change require a new interest in the effectiveness of our human contacts with the buying public. Obviously, this means a higher degree of skill in sales management and better trained sales people. Sales management should develop the business along logical lines and according to a plan. We should study available and profitable markets, competitive rates, allowable expenditures, proper organization, educational programs, and sales methods with the object in view of building a profitable and permanent load at a minimum expense.

Under the highly competitive situation, we should not rely upon ourselves entirely, but should go out and seek new sales allies. To accomplish this we must cooperate with manufacturers and appliance dealers to our fullest extent. Let the dealers and plumbers sell the equipment, thus increasing their volume and profit and helping the gas company sell gas. Dealers and plumbers should be educated to the advantages of gas over solid and liquid fuels and electricity, stressing the extent to which the gas company service is an advantage to dealers in selling gas appliances.

Manufacturers should be our best allies, and we should retain their good-will; this is an exceedingly important point, since there is still an untold scope of development before us. Tank waterheaters, for instance, deliver to the faucet only slightly over 20 per cent of the heat supplied to the burner and we certainly have room for improvement in the utilization of our product. This improvement can come about only through organized research, preferably under the auspices of the American Gas Association.

Sales Contacts

In our sales contacts with the public the real value of gas service is not sufficiently sold; hence the consumer imagines he is paying too much for his service, eventually requiring rate reductions to hold the business. A consumer is not sold on the value of gas until he is aware of the cost savings he has made in getting rid of other fuels. The real cost of gas is represented by the gas bill less the various extra expenses inherent to the use of other fuels, such as the labor, cleaning bills, garbage bills, etc.

The gas industry's propaganda should take the form of enlightening the public by lectures in city clubs and schools by bold statements setting forth the advantages of gas without exaggeration, and if this propaganda is pushed home with pertinacity until it is drilled into the minds of the public, we shall obtain a more favorable outlook upon gas.

We don't talk enough about ourselves or extol our accomplishments and the possibilities of our product. This habitual silence is doubtless due to a long era of successes, it being too readily taken for granted that what the industry knows about itself everybody else knows also. We cannot afford to continue with this attitude and more must be done to set forth the advantages of this nationally important product.

Another subject of publicity is that when anything important has happened in the gas industry or in your company, no matter in what department, it should find its way not only into advertising, but also into the news column of the public press.

Our problem is to keep the public gas minded. With increased appropriations for advertising, all dealers, plumbers, and pipe fitters dealing in gas appliances should particularly benefit. The future sales possibilities of our business, I believe, are irrevocably tied up with advertising.

Salary Standardization and Administration

"WHEN an organization becomes as large as our company," states an executive as quoted in *Salary Standardization and Administration,* a new report issued by the Metropolitan Life Insurance Company, "the administration of salary and promotion ceases to be the function of a proprietary individual, and becomes a problem to be handled scientifically." This new report is the result of a survey that was made by the Policyholders Service Bureau of the Metropolitan to determine the details of such scientific methods as now are in effective use.

Although considerable progress has been made in developing scientific control of the pay of wage earners, few organizations, according to the report, have attempted to evolve similar procedures with reference to salaried positions. The outstanding reasons for such control vary from that of obtaining a complete, accurate and impersonal description of the work done by each employee, to the determination of fair minimum and maximum salaries for each position or kind of work done throughout the organization.

The report states that it is generally recognized that the success of salary standardization depends to a considerable extent upon the intelligence with which jobs are evaluated and classified. The list of grades used by a number of organizations are given in detail in the report and the methods of making evaluations are discussed. The next step, according to the report, is the determination of salary limits for each group. Pointing out that actual methods of determining salary methods differ considerably, the report quotes the actual practices of several companies.

The report is illustrated with reproductions of a number of forms used by the contributing companies and, in an appendix, sets forth the classification of jobs used by three organizations.

Load Building—Theme of New York-New England Regional Sales Conference

Papers presented Contained stimulating thoughts on Replacement Range Sales, Kitchen Modernization, Refrigeration, Department Store Appliance Sales, Water Heating, Industrial Competition, Air Conditioning and House Heating

MORE than 200 gas sales executives attended the Regional Gas Sales Conference held at the Griswold, East Point, New London, Conn., June 28-30. Hugh Cuthrell, manager of the New Business Department, The Brooklyn Union Gas Company, presided at the opening session Thursday evening. Howard B. Hall, chairman of the sales division of the N. E. G. A. and commercial manager of the Old Colony Gas Co., East Braintree, Mass., presided at the Friday morning session.

The papers presented at the meeting could not be included in the July issue of the Journal, but are presented here in abstract.

"Gas Refrigeration—An Example of Co-ordinated Advertising and Selling"

Mr. Ruthenberg, Pres., Servel, Inc., gave an address which for clarity, simplicity and sincerity could scarcely be equalled. He built on a theme of co-ordinated advertising and selling, announcing fundamental and basic policies for the further extension of this appliance.

Faced with the problem of introducing a radically new Electrolux to supersede the satisfactory units of the past in a period of general uncertainty, the extreme summer heat proved "ample evidence of sound design and manufacture." As a result. "The one obstacle that had always closed a truly national market to Electrolux refrigeration had been successfully eliminated.

"Naturally this had to be done as a step preliminary to effective, large scale, cooperative advertising and selling effort. The result so far accomplished in 1934 serves simply to give one an indication of what can be accomplished after such cooperative effort shall have been well organized with the benefit of accumulated experience."

Mr. Ruthenberg briefly sketched the value of the load factor on gas plant operation; the estimated additional national load of two billion cubic feet of gas from the sales made in 1934 without any capital expense burdening this increase; and the coordinated sales plans.

Mr. Wenner-Gren, Chairman of Servel, Inc., summarizes this entire philosophy:

"To offer a good product is not the sum of a manufacturer's obligations. The merits of the product must be shown convincingly and in the right manner. People are preoccupied with the manifold interests of daily life, and voluntary examination into the true qualities of a household device is seldom made. This condition is taken advantage of by those who loudly proclaim surface appearances and novelties, whereas fundamentals should be considered, first of all—and, therefore, we must work thoroughly."

These fundamentals were elaborated by Mr. Ruthenberg with particular emphasis on eliminating unnecessary collections costs:

"The controlling theme of Servel policy in respect to Electrolux sales is, of course, cooperation with the gas utilities to the limit of our ability. Next, we must establish territorial quotas consistent with market potential. Finally, we must cooperate with the interested utilities in such manner as to bring about attainment of those quotas. Our plans are being rapidly developed with these objectives in mind.

"Anything that can be done to make possible the purchas of Electrolux refrigeration by families of small incomes will represent a step in the right direction. I am deeply conscious of the responsibility of Servel in this particular matter. But high finance charges are a serious obstacle, no less than relatively high installed price. The montly payment is the Crux of the situation. High finance charges are made necessary by the prodigious cost incurred by finance companies in booking, billing and collecting small monthly accounts. Here is a field in which the utilities can serve admirably by devoting their existing facilities to this work.

"This suggestion tied in with the experience that all-year selling might result in lowered costs of the product. The definite need was expressed as 'Automatic refrigeration is used just as consistently on New Year's Day as it is on the Fourth of July. Why isn't it sold consistently throughout the year? Because we are still ice-minded. We know we must buy summer refrigeration, but

we think God gives us winter refrigeration. Kitchen temperature is just about as high in the winter as it is in summer, and good preservation is a function of kitchen—not outdoor —temperature. Let's keep up the selling effort.' "

Future of Gas Refrigeration Sales

Mr. R. A. Malony, assistant sales manager, Philadelphia Gas Works, and Chairman A. G. A. Refrigeration Committee summarized the results of the Committee's experience in the past year by stressing the need for future activity. Some of the leading points made by Mr. Malony cannot be overlooked by gas utility anxious to safeguard its kitchen load:—

"The present saturation of mechanical refrigerators in terms of wired homes is estimated by most authorities at 25 per cent. It is recognized at the same time that there are definite limitations to future sales possibilities. Past experience has shown that as an appliance approached a point of 50 per cent saturation, new sales appreciably slowed up."

" . . . there is an available market of 30 per cent of our customers who will buy either gas or electric refrigeration."

"Just how soon are these people going to buy?"

" . . . the Government's program in the Tennessee Valley. Of a reported sales volume of 1200 major appliances during the opening drive, 750 were electric refrigerators."

"A model built expressly for the T. V. A. to sell at approximately $75. retail, but offered throughout the country, it is little wonder that a large Southern holding company expects saturation of between 65 and 70 per cent within the next three years. The refrigeration market is literally being rushed to the practical saturation point."

" . . . formidable competition of an industry rolling along behind a $25,000,000 barrage of advertising."

"There is no longer the need for caution necessary in promoting a new appliance. The product is a practical success."

"We may be shattering sales records but so are others. As a single illustration, it is estimated that close to 400,000 mechanical refrigerators will be sold by department stores this year."

" . . . possible to contract for delivery, including uncrating and placing in the customers' kitchens, at three dollars ($3 per refrigerator. Outside warehousing can be had for an average of 70 cents a refrigerator per month with a cost of 65 cents additional for checking in and out. Installation costs do not exceed $5."

" . . . there is an ample margin for genuine promotion. Rather than spending this profit for other purposes, could it not be used more effectively on refrigerators? No one disputes the insurance that gas refrigeration in a home offers to gas cooking."

"Half of 1934 and two full years are ahead before our estimated sales curve begins to taper off."

"The problem is clear cut, but it requires this definite and immediate action: 1—Call together the interested executives of your company for the purpose of deciding just how much of the refrigeration market you want. 2—Select the method of distribution that will accomplish your goal. If you believe that your local dealers with your assistance will be the important factor in reaching the end desired, expand and cultivate these organizations on a more ambitious scale."

"Gas refrigeration is a twelve month business."

"3—Lastly, don't wait for competition to set your sales policies. Several gas companies are considering longer selling terms at the present time. As we reach the lower income classes it is essential that terms be made to suit the pocketbooks. Monthly payments of less than $5. are required to sell the householder with a monthly income of $100."

Replacement Range Sales

Realizing that a new refrigerator invariably made the other appliances shabby by comparison the topic—"Replacement Range Sales" was widely assigned to Mr. E. C. Sorby of Geo. D. Roper Corp. His talk stressed the value derived from selling the results obtained from the modern range instead of the appliance itself. The customer senses these values because of her experience and being sold by the gas company she is certain of the quality and responsibility. Mr. Sorby's summary added other advantages to the gas company such as the modernization of the gas equipment, the convenience and comforts of automatic lighting, the non-seasonal appeal to the customer and the better results by reason of the intensive research and development of these newer cooking appliances.

Methods of Promoting Kitchen Modernization

The extension of gas service in the kitchen was carried over into the second session presided over by H. B. Hall, Old Colony Gas Co. and chairman of the Sales Division of N. E. G. A. At this session Mr. H. E. Dexter spoke on "Methods of Promoting Kitchen Modernization." As chairman of the A. G. A. Kitchen Planning Committee and general commercial manager of the Central Hudson Gas & Electric Corporation, Mr. Dexter has been able to give freely of his experiences in this field. In addition to the analysis of a questionnaire sponsored by the Home Service Committee, Mr. Dexter told of the very complete procedure followed in the Central Hudson system. This plan provides the customer with complete and detailed information about Central Hudson service applied to the customer's own home. Each presentation is therefore individual and in this way becomes of sufficient value to be retailed by the customer until the recommendations are made.

Kitchen Heating

The many factors not immediately and directly connected with gas fuel govern its use for cooking was ably demonstrated by Mr. A. V. S. Lindsley, Chairman of the N. E. G. A. Kitchen Heating Committee. It has long been known that many prospects bought very expensive coal and wood ranges in preference to less expensive gas ranges because of the cold kitchens in the homes. Mr. Lindsley's report of interest not only to smaller suburban companies but also to the larger companies where unheated flats occur in numbers shows the following increases in gas consumption because of gas-fired kitchen heaters.

ANNUAL CONSUMPTION

Type Heater	Before	After	Increase
Space Heater	37,620	64,730	27,110
Conversion Heater: Full Gas Service Before	50,310	89,580	39,270
Conversion Heater: Partial Gas Service Before, Full Gas Service After	25,730	75,020	49,290
Conversion Heater for Kitchen and other rooms	22,930	117,715	94,785

The conversion heater used is one which takes the place of the coal or oil heating space of the Utility Type Range. Too much cannot be said for the initiative of this committee which has shown the way to replace 12,300 lbs. of coal or 950 gallons of oil by almost 90,000 cu. ft. of gas. The Committee conclusions are of great interest as they say:—

"1. The new equipment that has been made available offers the necessary tool to accomplish successful kitchen space heating . . . "

"2. The records on a sufficiently large number of kitchen heating installations indicate that the kitchen heating load can be developed at gas price levels that are remunerative to the gas industry and that now prevail in many New England communities."

"3. Your Committee urges that the member companies give careful study to the subject of kitchen heating and the data presented, in the hope that the industry will be enabled to present gas kitchen heating service to New England's domestic gas customers under a united front and successfully develop this market that economically belongs to the gas industry."

Employee Industry Development Plans

Following the discussion of Mr. Lindsley's paper, Mr. A. A. Sweeney, Sec'y of the N. E. G. A.'s Sales Division, spoke of plans for developnig the complete cooperation and support of the employees:—

"A committee was appointed to develop these suggestions into a program of industrial development, and the next three months were devoted to a careful consideration of all phases of the situation. Particular attention was given this matter of employee participation, and the final plan contemplated every gas company employee as a working partner in the Program.

"In January of this year a second meeting of the officials considered the proposed Program, which was approved, and the committee was instructed to introduce our Gas Sales Program to the retail company organization. The presentations were made at ten evening dinner meetings, attended by 1,350 of our employees, in the form of a conference of the committee, with a discussion of each problem and adoption of recommendations as to methods of procedure with regard to each problem."

The four objectives logically fall into the four major groups:—

"1. Holding the Present Load.
"2. Restoring Lost Customers.
"3. Increasing Customer Consumption.
"4. Developing New Business."

The procedure was further subdivided into a total of 60 specific recommendations printed and published to the employees as the *Gas Sales Program.*

With 3,000 employees actively selling gas service to the group of 265,000 gas customers of the New England Power Association success was foreordained. The results show that non-selling employees were so well grouned in the gas story that 2,462 leads were returned and 409 sales made. The proportion of sales to leads is well in line with that of the best sales representatives.

R. H. Staniford completed the morning's work with his paper, "Gas Sales Promotional Work in the Baking Field," which was published in the July issue of the *Journal.*

Sales Manager As a Business Leader

The session on Friday evening was conducted with Mr. R. H. Knowlton, 1st Vice President, N. E. G. A., presiding. The papers presented dealt with most interesting phases of sales work. Prof. E. H. Schell of M. I. T. chose as his topic, "The Sales Manager as a Business Leader." His talk confirmed the actions of those companies who are carrying out sales activities on the basis of fundamental principles of sound economics. It further served as a warning for all who are ignoring these basic facts and attempting to operate on more attention-getting but flimsier grounds. If careful emphasis is placed by the sales manager on fundamentals of painstaking market analysis, close contact with the prospects and customers in the field and in obtaining the counsel of all those engaged in active sales work, the sales manager should fulfill his position in the community as a business leader.

Department Store Appliance Sales

In view of the increasing sales of appliances made by department stores, the selection of Mr. Lee Jalkut, assistant merchandising manager of Gimbel Brothers New York store was fortunate. The place occupied by these groups was definitely set as replacing the smaller specialty appliance dealer. This was caused, Mr. Jalkut said because the smaller dealer through unsatisfactory service, insufficient capital, greater attention to factors other than sales, could not instill proper confidence in the prospect's mind. The need to the department store of higher priced articles was caused by the decline of the average sale to a point below $2 and an increase in cost of conducting the business from 32% to 38%. Obviously an appliance selling at amounts considerably above the average should in a large measure overcome both these difficulties. On the other hand it is hard to see how the expedient used by Gimbels to overcome the installation and servicing of ranges could greatly reduce the cost of doing business. The cost of the service company who deliver, install and service ranges surely must be reflected in the selling price and mark ups comparable to those used by other organizations would bring selling prices closely paralleling those of the other outlets.

The Water Heating Market

R. J. Rutherford, vice chairman, Sales Division N. E. G. A., in his paper, "Protecting and Developing The Water Heating Market," set up a hypothetical gas company serving approximately 20,000 customers, which he called "Resting-on-Oars Gas Company." Here are a few of the highlights.

"Gas refrigeration seemed to be doing nicely—each year in spite of the late minor boom this device approximately doubled in sales. Then there was kitchen heating—there was a great potential market—but, didn't we used to have some water-heating load? Certainly, we used to sell about a hundred automatics a year."

" . . . the rates were looked at first. They didn't look so good. What should be be? What is the market? What is the competition? What do people think of heating water with gas? How are the heaters working that are out?"

"The first more was to determine what the market was. This required a knowledge of all types of equipment already installed in customers' homes."

" . . . only about 40 per cent of the customers used gas for heating water at all. Only 5 per cent used gas automatically. About 10 per cent had installed or previously used automatic equipment, but not only half of these did now. Nearly 80 per cent of the customers had range boilers, used either with gas or some other fuel."

". . . indirect hearts in coal boilers, furnace coils, oil burners, pot stoves, automatic oil storage heaters, electric storage systems, manual oil heaters for converting gas tank heaters, range burners, water fronts, backs and sides, legs—literally hundreds of schemes."

"If the competitive advertising were or even half true, gas was not in the picture."

"If the competitors' claims were real, then maybe gas shouldn't be after the load at all."

"As the tests progressed, it was definitely shown that gas at a fair figure would easily compete with existing equipment and fuel prices. This information then provided the answer to the rate question. Accordingly, new optional rates were laid out as a result of these findings which incidentally also gave impetus to the entire idea."

" . . . the most feasible and practical seemed to be the one used by the electric industry, namely, some form of rental-purchase plan."

" . . . the question of equipment and operating costs. During all this studying and investigating, however, much thought had been given to equipment to meet the market."

" . . . three operating cost divisions, unlimited, medium and limited."

" . . . continuous flow, storage high input and low input heaters."

" . . . it was decided that the sales department could make a preliminary call on all customers whom the survey showed to have automatic water heaters, advising them of the new rate. When the customer signed, the service department could then follow up, adjust, check, and set the heater. In the event an inefficient heater was encountered, the salesman could explain that the new high efficiency ones coupled with the new rate would insure satisfactory service and back up his statements with unprejudiced facts and data. Thus old users and discontinued users would at least know of the changes."

" . . . salary represented about 80 per cent of the total and the load-building bonus, 20 per cent. This permitted the direction of the salesmen to keeping heaters in use."

" . . . it was non-competitive with the dealer . . . "

". . . home service department developed a series of water-heating educational programs such as dish-washing recipes, health recipes, draw tests using large dial meters reading directly in pennies to show an audience how little it cost."

"In a normal year some 100 automatics. The best month was 21. Today as a result of the new plan, they are averaging 10 heaters per week and this has gone on every week for the past 14, and is even getting better. He has found it necessary now to add three water-heater specialty men under a supervisor because the sale of ranges and refrigerators has suffered."

" . . . very interesting thing is that the sale of tank heaters has tripled over the previous year. In fact, all water-heating activity and thinking has been stimulated. The actual sales closed outright are equal to last year but in addition, of course, about twice as many heaters are on rental."

Putting Idle Equipment to Work

Mr. N. T. Sellman, Chairman of the A. G. A. Commercial Section was in charge of the final session on Saturday morning. The talks given were of unusual quality and proceeded with enthusiasm from the first words of Mr. P. D. Gardner, Public Service Electric & Gas Co., Newark, N. J., in his talk, "Putting Idle Equipment to Work." He said, "A study of idle services and meters, while varying greatly in municipalities of different characteristic, will almost inevitably show idle capital ready to work for you under the right conditions." He then proceeded in great detail to enumerate the conditions. The idle equipment resulted from the depressed circumstances of the customers and the reluctance to ask for favors in continuing a delinquency. He cited the value of prepayment meters in giving the customer the benefit of gas service as he could afford and in keeping competitive fuels out. The result of special attention by tactful personnel to delinquent customers has been worthwhile, some surveys showing a definite re-connection of 20% of idle meters and in one case (Northern Indiana Public Service Co.) an increased load of over $100,000 for an expense of only 10% of this amount.

Mr. Gardner's talk re-emphasized the editorial of May 2, 1876, in the *American Gas Light Journal* which said in part:—"While the gas manager has to furnish less gas, he has more time for study and improvement." And, "It has become chronic with too many to cry 'hard times' and make no effort to relieve them." Mr. Gardner has taken heed. He sat down, studied and the result shows he has made a strong serious effort to relieve them and will surely succeed.

Industrial Competition

Mr. C. B. Phillips, vice president, Surface Combustion Corp. of Toledo, in his talk, "Meeting Today's Industrial Competition," again reiterated the need for close cooperation between the Industrial Sales Group, the management and the customer. Fundamentals of selling again were hammered home and a plea made that the industrial load, so often an orphan, be given not merely sympathetic treatment but actual sales help. The effect of volume of base load, character of use and load factor must often have more consideration in setting a rate than complete economics of the rate and often it is not "can you afford to lower rates, as much as it is can you afford to lose the load." Finally, Mr. Phillips was very insistent in hoping for more success in bringing together the higher executives of both the utility and the customer. Then personal friendly relations between the two managements would lead to easier solutions of mutual problems.

Air Conditioning and House Heating

A feeling of optimism could be felt throughout the paper on "Air Conditioning and House Heating," delivered by Mr. W. S. Walker, engineer of utilization, Consolidated Gas Co. of New York. Mr. Walker pointed out the advantages which gas offers to the home through the simplest type of year round air conditioning:—

"Competition of automatic heating systems using low grade fuels is foremost in the minds of those having the responsibility of house heating sales. Much has been said about meeting this competition through better sales methods and through other means. Two aspects of it, namely the unprecedented low price of oil and the limits to which it is sound business to lower rates in getting this load are not within our control. However, there is one aspect of this competitive situation which warrants more attention than it is receiving by the industry. This is the matter of increasing the popularity of the so-called air conditioning functions; cleaning, circulating and humidifying. To this we are about to add cooling and drying of air in summer. When the consumer can be convinced that he should have these comforts gas immediately has a definite advantage over other fuels. The warm air heating system is a good illustration. For an average house, a gas warm air furnace costs $900 and a comparable system operated with oil costs about $2,000.

"An illustration of how the wider outlook may affect the situation, take the case of warm air heating system which experiences a definite lack of acceptance. This may be explained by the bad reputation of the old 'hot air system' with its frequently inadequate duct system which was often designed by the rain pipe specialist. However, with a complete air conditioning plant in view the warm air system, composed of a compact

heater, humidifier, fan, filters and an adequate duct layout, comes into its own. It should be mentioned that the design of duct systems is a necessary function of the new air conditioning division and one or more men should have training in and responsibility for their proper installations.

"We have, ourselves, recently presented layouts to several architects and builders who are working on projects involving a considerable number of small homes. These are intended to sell at a price which would not ordinarily be considered in the air conditioning price class. However, both initial and operating costs figure out surprisingly well. One project involved five room bungalows with an insulated roof and double sashes. Only a 42,000 B.T.U. input was required which resulted in a saving in space occupied by equipment and permitted the installation to be made on the first floor. A saving in construction costs through the elimination of a cellar could then be credited to the warm air heater and a further saving to the simple duct system which replaced more expensive radiators and piping. The interest on the money thus saved approximately $800.00, applied to the fuel account, makes such installation feasible in any locality, regardless of comparative fuel cost."

For auxiliary humidification Mr. Walker referred to the unit type gas heated humidifier announced at the Heating and Ventilating Exposition in New York, and "offer possibilities of gas load although the central plant may not be gas." His paper concluded with a complete description of a new room type dehumidifying and cooling unit.

Mr. L. B. Crossman, Industrial Fuel Sales Manager of the Boston Consolidated Gas Co. "went into the bag" and pulled out experiences of great value to his listeners. His long servics as the true type of sales manager, who personally knows his customers, stood him in good stead in presenting these happenings.

"A recent development which should aid in popularizing dehumidified and partially cooled air is the adaptation of the Silica Gel principle to small unit conditioners. While its ultimate possibilities are not yet realized a discreet selection of customers, for whom it is suitable may provide an immediate outlet for a number of models."

Gas Company Builds Good-Will by Helping Welfare Fund

IN MARCH, 1934, the unwelcome information was received by the School Board that all schools in Sapulpa, Oklahoma, must close several weeks ahead of the regular term due to the lack of necessary financing and receipt of federal aid. The chief topic of discussion among parents was the standing of the pupils' credits and ratings of seniors to be graduated; and to the Parent-Teacher Association, which had long since assumed the obligation of furnishing lunches throughout the school year for underprivileged children came the realization of a large deficit at the school cafeteria and their inability to continue this worthwhile service to the children of many families. To the welfare chairman came the news of certain seniors who could not possibly meet the cost of graduation, including rental of caps and gowns.

On April first the Sapulpa Gas Company installed for display a model kitchen in their window. The idea occurred to someone that it might be made a "live" window by actual cooking with the products sold for this welfare fund.

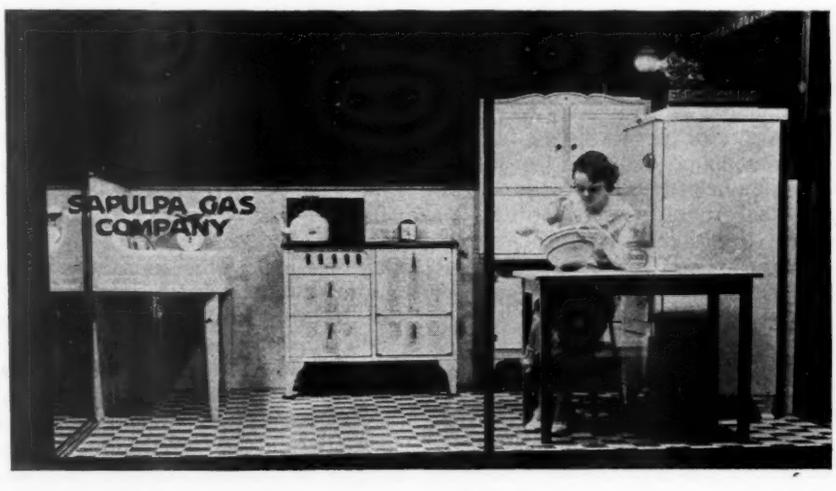
A committee conferred with the company which, through its representatives, expressed its eagerness to assist in the cause. R. E. Aitcheson, president, suggested further that perhaps a cake-baking contest, for which the company would be glad to offer cash prizes, might stimulate interest. The project almost immediately became a community interest, with the model kitchen a community center.

The Parent-Teacher Association president divided the committee into four groups, each having charge of a week of the month, and to act as hostesses and demonstrators. The home economics department of the high school, under the supervision of its chief, co-operated in the work and for one week young senior ladies of the senior division demonstrated scientific methods of cake baking in the window. Butter cakes, angel food cakes, devil's food cakes and many others were baked in the company's window and sold immediately to an eager public.

The project grew and momentum increased, and patronage was so great that all orders could not be filled during the last week, when volunteer workers filled the model kitchen. A selected group of young musicians from the high school organization formed an orchestra, which played on Saturday afternoons to entertain the large numbers of people who filled the gas company's waiting room, where the judging took place. The attendance was far beyond the capacity of the gas company's premises and overflowed into the main street.

The success of the program from a financial standpoint was complete and the Parent-Teacher Association not only retired an old deficit in its cafeteria fund, but realized sufficient monies to complete the short term this year and goes into the ensuing school year with a credit balance for the feeding of underprivileged children.

The Sapulpa Gas Company, through its sponsorship and co-operation, secured for itself many new friends and by this unique method of co-operation with a worthy cause has immeasurably bettered the good will of the public at large, as well as re-creating an interest in the use of natural gas for cooking.



Technical Digest

CARBONIZATION OF COAL IN THE LABORATORY AND THE PLANT

Laboratory assay tests have failed to consider such factors as the carbonizing time, the rate of gas evolution and length of coal charge. A new assay method and apparatus with by-product recovery train are described wherein coke-oven conditions and results are duplicated in a laboratory test at 900° which can be adapted to various oven demensions. Coal charges of 50-60 g. are carbonized in a refractory tube of one half the oven width, either for a time calculated in proportion to size, that is, 55-70 minutes for two sizes of Koppers ovens, or to conform to an over gasification rate. The furnace is gradually moved out over the tube as the test proceeds, to simulate progressive heating as in an oven, the off-take being through the already heated coal. Production of coke, gas, tar, benzine and ammonia are plotted to show the effect of variations in the carbonizing time in the apparatus with both procedures for comparison with oven data.—
—Fr. Sladek, Brennstoff-Chemie, v. 15, *p.* 1-4, 1934; *Chem. Abs.,* 1934, 3217.

RECOVERY OF BENZENE BY ACTIVE CARBON

A description is given of the cyclic process for the recovery of benzene as developed at Beckton, England. The benzene is first absorbed from the gas by the active carbon in an absorber, from which the heat of absorption is removed by circulating water in coils. If the benzene is not all absorbed, as indicated from the observation of a flat flame burner, the absorber is replaced with one which has been freshly steamed. The spent absorber is regenerated by means of either direct or indirect steam for 30-40 minutes. The hot regenerated carbon is cooled rapidly by passing fresh gas through it. The temperature of the absorber should always be maintained as low as possible, but not lower than the gas temperature, otherwise condensation may ocur. At the end of the steaming period the quantity of water in the carbon should be between 15% and 20% in order to extract sufficient heat to prevent the formation of gum, which causes contamination and deterioration of the carbon.

The present annual production of benzene is 3,000,000 gal., which corresponds to 3.1 gal. per ton of coal coked in horizontal retorts and coke ovens. The external efficiency is ordinarily over 92%. The average overall steam consumption has been 36.6 lb. per gal. of benzene and the average rate of carbon replacement has been 7.1 lb. per 1000 lb. of benzene. Practically all the thiophene and carbon disulfide are removed from the gas, and for a six months' period it was found that the sulfur in the gas was reduced from 30.5 g. to 6.1 g. Only gas which is free from hydrogen sulfide, naphthalene, and associated unsaturated hydrocarbons is treated.—
—H. Hollings & S. Hay, Gas World, vol. 100, *p.* 189-193, 1934.

GUM FORMATION IN PURIFIED CITY GAS

A review of the work which has been done on the causes of gum formation in gas is given with reference thereto.

Coal gas contains in very small amounts hydrocarbons of the type of Cyclopentadiene, Styrene, Idene and Coumarone. Sufficient quantities of these organic bodies, however, are present to form resinous products under the influence of certain chemicals present in the gas. The above products themselves tend to form resinous compounds, but more readily under the action of oxygen or oxidizing products

NO_2 in the gas comes first into consideration as the cause of the formation of resinous condensation products, since iso-nitose bodies are probably first formed which lead to further changes. The NO_2 probably originates in a smoky gas and it may also be formed by an overheating of the gas. The velocity of formation of NO_2 from the initially present NO is important in effecting the formation of gums. It is favorably influenced by time, a low temperature and an increased pressure, and by a reduced content of water vapor.

The presence in the gas of oxygen, ammonia or sulfur compounds either has a direct or on account of iso-hitroso compounds, a polymerizing effect leading to the production of condensation products.

The elimination of the tendency for the ploymerization of the unsaturated hydrocarbons is difficult on account of the fact that the agents which promote this effect are present in such small volume in the gas.—
—K. Bunte, Das Gas-und Wasserfach, vol. 77, *p.* 81-86, 1934.

COMBUSTION CHARACTERISTICS OF GAS WITH LOW CARBON MONOXIDE CONTENT

Manufactured gases for use in Germany should have heating values in range of 419-450 B.t.u. per cubic foot, and not below 419 B.t.u. or else the mains may be over-loaded, although the heating value may rise 10-20 per cent above 450 B.t.u. The specific gravity should be between 0.54 and 0.40. The ignition velocity should be between 20 and 30 in. per second. The Ott number should not be below 55 or a striking back may occur. The addition of blue gas to coal gas increases specific gravity and its maximum ignition velocity, as distinguished from the effect of the addition of producer gas which decreases the maximum ignition velocity.

Gases of low carbon monoxide content (below 1 per cent) were prepared from manufactured gas by the catalytic conversion of the monoxide to the dioxide with steam. Sufficient nitrogen was added to give a gas of the original specific gravity and hydrogen then added to just the ignition velocity. The ignition velocity was found to be too low for a mixed gas having a specific gravity of 0.4 and a heating value of 400 B.t.u. per cu. ft. By subsequent complete removal of carbon dioxide and the addition of hydrogen a satisfactory ignition velocity was obtained but at the expense of the specific gravity. For gases having a specific gravity of 0.5 and a low carbon monoxide content the ignition velocity was too low and long flames resulted, with danger of incomplete combustion. The specific gravity of such gases should not exceed 0.4 to 0.48 for a heating value of 419 to 450 B.t.u. A gas of this kind is best prepared by mixing coal gas and blue gas before removing the carbon monoxide. The carbon dioxide must then be partly removed to adjust the specific gravity of the resulting gas.
—Dietrich Witt, Gas-u. Wasserfach, v. 77, *p.* 97-102; *Chem. Abs.,* 1934, 2876.

Baking Exhibit At World's Fair

Humidification of Proofer which is heated by gas-fired steamed Boiler.

By J. B. NEALEY
American Gas Association

THE mass production of bread in all its mechanical details from raw materials to finished product, including a continuous oven, is being exhibited by the Continental Baking Company at the Chicago World's Fair this year. Welcoming the opportunity to show its nation-wide clientele just how high quality is maintained this concern has incorporated one of the most modern bakeries within its exhibit and this unit is probably the largest ever displayed at any fair.

Horseshoe in shape the exhibit is viewed from a visitor's gallery, a puppet being the first thing to be seen as one enters. The first unit in the bread-production line is a flour blender of the motor screw type. The blended flour is lifted by a bucket elevator to an overhead screw conveyor, which delivers it into a hopper over the mixer. The hopper is on weighing scales, which automatically stop the motors operating the blender and conveyors when the correct amount of flour has been received. Water is measured out in a small tank on similar scales, which shut off the flow mechanically when the proper weight has entered. Flour, water and the other necessary ingredients are then dropped into the mixer, which is motor driven.

The sponge is then dumped from the mixer into metal troughs, which are put into a fermentation room with glass windows so that the fermentation process is visible from the outside. This room is provided with a continuous flow of air, that is washed, humidified and heated, the proper degrees of humidity and tempeature being maintained by automatic controllers. The fermented sponge is dumped back into the mixer by means of a mechanical trough handler.

The bread dough is transferred to the divider hopper by another mechanical trough handler. This divider is of a new design with a pair of dough compartments in a steel roller, which are charged and discharged at every half turn by plungers. These dough balls are transferred to the rounder by a belt conveyor and when rounded are discharged onto the traveling conveyor of an overhead proofer. This conveyor is of the tray type, but is unique in that the trays, holding six dough balls each, are of wood, thus eliminating sticking, sweating, etc. The proofer is glass enclosed for observation.

After passing through the conventional molder the dough balls are panned and the pans are placed in racks, which are run into a proof box. Both the overhead proofer and the proof box are supplied with washed air, properly humidified and heated as in the fermentation room. All these machines are finished in highly polished chrome plate.

Baking is accomplished in a gas-fired oven that is automatic and continuous in operation. It is equipped with a motor-driven, tray-type conveyor, with a speed reducer by which the baking periods are regulated. Heat is supplied by a single gas burner, which fires into a sort of radiator.

This is composed of a flat boxlike steel combustion chamber from which leads a series of steel tubes ending in a collection chamber, from which the products of combustion are vented. The flow of gas to this burner is regulated by a temperature controller so that the heat of the oven never varies from a predetermined point.

The baked loaves are dropped by a gravity spiral chute to an overhead belt conveyor in a room below, and then delivered into a glass-enclosed cooling room. Cold air is forced into this room. The cooled bread is eventually sliced and wrapped in automatic machines and a conveyor takes it to the trucks which are used for delivery. Cake is baked in another type of gas oven.

A series of dioramas and shadow boxes show typical scenes illustrating the science of the baking art. On the ground floor is a large and complete retasaurant, in which Wonder Bread is featured.

This exhibit is of great interest to everyone and is one of the most instructive at the fair. No one ought to miss it.

Profitable Pointers

—DURING the past two or three years we have expressed the opinion that alert gas men would not only bend every effort to secure new cooking loads but that they should also devote a major portion of their promotion talents to retaining their present cooking load. We have seen this idea adopted in many quarters, especially in communities where other fuels became active to capture this load. These activities were, as we viewed it, worth while, yet nothing to cause the housewife to suddenly get rid of her antiquated cook-stove and purchase a modern gas range, nor were they such as would sway the woman who had been "worked on" by the man selling the competitive fuel, to the point where she had about decided to change from gas. Now we find a gas company which, judging from their advertising and the co-operative set-up with dealers, is determined not only to retain the cooking load but to develop it to the nth degree through a trade-in plan that is almost impossible to resist. The advertisement reproduced below tells the whole story. Study it. You may wish to devise some similar plan. Editor's Note: We understand this activity was highly satisfactory.

94 St. Louis Gas Range Dealers
OFFER
FOR A LIMITED TIME ONLY!
DOUBLE TRADE-IN ALLOWANCE
ON YOUR OLD RANGE
Now—Save $20 to $50!
ON SELECTED LIST OF NEWEST STYLES AND DESIGNS
FULLY-EQUIPPED
GAS RANGES
Priced From $94.50
How the plan works
$94.50
$20.00
$74.50
FAIR WARNING! FOR A LIMITED TIME ONLY!
AN EXCELLENT OPPORTUNITY TO MODERNIZE YOUR KITCHEN
GAS—THE ACCEPTED FUEL FOR MORE THAN HALF A CENTURY...
This Emblem Means Double Trade-In Allowance on Gas Ranges
This Offer Open to St. Louis Residents Only
THE LACLEDE GAS LIGHT CO.
OLIVE AT ELEVENTH

—WHEN you go into the home that has small children, particularly infants, say to yourself here is the place to get over the story of automatic hot water service. Try it out and you

will find that in such homes you will always find a receptive listener—mothers all know the value of such service, but it is brought home to them daily and forcibly where there is a baby to bathe daily.

—A MAN who made a very good record of selling gas ranges during a 30 day drive last year, told me the other day that he attributed his success to the fact that he had employed a young lady to do his canvassing for him by telephone. His plan was to furnish this girl a list of names each morning which she was to call around 9 a. m. and 2 p. m. When she put in her call and got the woman to the 'phone she would say: "Good morning Mrs. Consumer, this is Miss Clerk with the gas company. I called to tell you about a special offer we have on gas ranges this month. There are three models, priced at $49.85, $74.50 and $98.75. Of course you know you may purchase any of them and have them installed for a small down payment, then too we will make you an allowance for your old stove. May I send a salesman out to tell you about them this morning?" When the housewife said "well my stove is just like new" the girl would say: "If it is working perfectly, that is fine, but if you feel that there are any adjustments needed, I will be glad to send down and have them made for you without cost." In several cases this offer of service caused the woman to make some inquiry about the new line of ranges with the result that an appointment was made for the salesman to call and in one or two instances sales resulted. In listing names to be called small compact districts were laid out and names compiled by district rather than taken alphabetically from the telephone directory. This saved much time and enabled the salesman to call in person within a very short time after the first contact was made.

—LOOKS to me like the gas water heater manufacturers are again turning to the instantaneous type heater. Two manufacturers have recently announced new models. There can be no question as to the efficiency of this type of heater, gas men know that it will give excellent service. The "fly in the ointment" is that the large, sudden, demand requires larger services and meters than the average home has, therefore the investment up, but at that it will cost no more goes to install than a service for an electric water heater. Think that over gas men. Do you want the water heater load or do you want an off-peak electric heater to supply hot water service to the home?

—THE Providence (Rhode Island) Gas Company has a happy plan for getting the idea of the modern gas kitchen into homes. Their plan is to send the housewife-consumer a

1934 calendar depicting the modern all gas kitchen with a terse bit of selling talk at the top of each monthly page.

—WHILE the idea of "Free Recipe Books" is an ancient one it still draws fire. Many companies are giving it a new twist, make it do double duty. These companies advertise the "Free Recipe Book" in their newspaper advertising or through the use

of direct mail and require those who desire the book to either send or bring in a coupon or post card. This gives the salesman on the floor or in the field an opportunitv to contact those making the request personally with the result that prospects are developed and sales made, in many instances.

—TO us one excellent idea that is being given a great deal of attention by gas men is the promotion of the "All Gas Kitchen": We do not see how this old idea, modernized, can help from spreading and become a country wide movement. Every gas company in the land should, if they have not already, built a modern all gas kitchen in their stores and keep it MODERN at all times. For instance, these kitchens should contain the very newest and most modern range manufactured in the line that they carry. This range should be installed just as soon after the manufacturer announces it as it can be obtained. The kitchen should also contain one of the new white instantaneous gas water heaters which may be given a special place in a wall niche in the kitchen wall, then there should be one of the new air cooled gas refrigerators with chromium hardware, trigger trays and temperature control. These things should be installed at once and advertisements and invitations should be published and sent out featuring the *Newness* of modern gas appliances.

Home managers are being told about these modern conveniences in their favorite magazines and it's up to we gas men to say to them: "Here we have those appliances all set in proper atmosphere—come in and see them, let us tell you how easy they are to own."

—ACCORDING to reports the cooperative gas range advertising done in Chicago late in the fall of 1933 was very productive. As the story comes to me there will be big things going on in that line again right soon. We hear that one and perhaps more range manufacturers have joined the line up to sell Chicago housewives modern gas ranges. Another cooperative activity that produced originated in Pittsburgh and we understand that that activity will be carried on again this year.

—IT seems to me that advertising men of the GAS industry are right in step with the times. To any one the least observant of the recent trend of GAS company advertising must come the feeling that this change to the tempo of the times, the day of the consumer is welcome and that it will be productive.

There is none of the sophistication, that so many advertising men seemed to think was so essential to printed salesmanship but a short time ago. These advertisements get down to cases immediately.

Another pleasing thing about them is the abundant and judicious use of photographs. These photographs either show the appliance or illustrate the discomforts the lack of some appliance brings to the home.

The man who studies the present trend in GAS company advertising will also note with a feeling of gratification that the copy gets right down the average man's alley and talks of the benefits to be derived from modern gas appliances—they actually talk to folks who buy gas and gas appliances in a manner that they all will understand.

A fine example of this modern, sane, selling, type of advertising is shown by the examples of some recent gas water heater advertisements of the Consolidated Gas Company of New York.

Nobody [Except your Gas Company] has to "tend" a Gas Automatic Water Heater!

5 Reasons
FOR HAVING AN Automatic
Gas Water Heater
1. Instant hot water always on tap—day or night—in adequate quantities.
2. Keeps uniform temperature. No scalding or lukewarm water.
3. Provides clean hot water from rustproof copper tank.
4. Automatic vent—saves repeated hand-lighting and stair-climbing.
5. Prevents waste of water and fuel.
$5 DOWN
Installs a gas automatic water heater in your home. Trial installations, at our risk, during period of this offer.

NO need for busy wives and mothers to lose sleep providing hot baths for the family. Not when a *Gas Automatic Storage Heater* costs so little to install and to operate!

A *Gas Automatic Heater* means plentiful hot water—at just the temperature you want—any moment of the day or night. Thermostatic control and an *insulated* tank eliminate fuel waste. Built of copper, this tank gives clean, rust-free water for a life time!

Be sure the Gas Appliances you select carry the seal of approval of the American Gas Association Laboratory.

Find out about our 30-day free trial installation. Investigate the easy terms offered at any gas appliance dealer's or your Gas Company showroom!

CONSOLIDATED GAS COMPANY OF NEW YORK
and affiliated GAS companies

Winners of Nation-Wide Refrigerator Sales Contest Announced

GAS companies that won the "blue vase" in the "Go-Getter Contest," the nation-wide gas refrigeration sales contest sponsored by the American Gas Association Refrigeration Committee are the Southern California Gas Company of Los Angeles, the Dallas Gas Company, the Metropolitan Utilities District of Omaha, the Tampa Gas Company, the Tyler Gas Service Company, of Tyler, Texas, and the United Gas Public Service Company of Huntsville, Texas, according to an announcement by Ronald A. Malony, chairman of the Committee.

The awards were based exclusively on installations of Electrolux refrigerators manufactured at Evansville, Indiana, which are marketed by gas utilities in all sections of the country. The "blue vases" will be presented to officials of the winning companies at the forthcoming annual convention of the American Gas Association to be held in Atlantic City in October.

Cash Prizes and Blue Vases Awarded

The "blue vase" was won by companies that made the highest record in their various divisions. In addition to the vases, the six companies above mentioned won cash prizes of $300 each, except in the case of the Southern California Gas Company of Los Angeles which received $500.

Other cash prizes were awarded to companies who won second, third, fourth and fifth places, the total cash awards amounting to $6,700, twenty-eight utilities in all having received cash prizes. Twenty companies received "honorable mention" for their high record of sales.

Mr. Maloney commented upon the enthusiasm that had prevailed among the thousands of gas salesmen in all parts of the country who participated in the campaign. "Reports from the field," he said, "indicated that the contestants had carried on their activities very much as if the contest had been a game. Credit goes to the sales forces who helped make the campaign a success, but the Committee also congratulates managers who conducted the contest as though they were leaders of football or baseball teams. Everything was done to stimulate interest among salesmen to make their company the winner of the 'blue vase.'

"The 'blue vase,' adopted as a symbol of success by the Committee, has been awarded only to those companies which stood first among companies of their size in the contest."

Companies that gained second place were: Washington Gas Light Company, Washington, D. C.; New Haven Gas Light Company, New Haven, Conn.; Birmingham Gas Company, Birmingham, Ala.; Utah Gas and Coke Company, Salt Lake City, Utah; Community Natural Gas Company, Eastland, Texas, and Municipal Gas Company, of Ennis, Texas.

Winners of the third prize were: Philadelphia Gas Works Company; Providence Gas Company, Providence, R. I.; Scranton-Spring Brook Water Service Co., Scranton, Pa.; Southern Cities Distributing Co., Shreveport, La.; Municipal Gas Company, Denison, Texas, and the Municipal Gas Company, of Hillsboro, Texas.

Fourth prize winners were: Columbus Gas & Fuel Company, Columbus, Ohio; The Manufacturers Light & Heat Co., Bellevue, Pa.; Ohio Fuel Gas Company, Newark, Ohio; Community Natural Gas Company, Pilot Point, Texas, and the Ohio Fuel Gas Company, of McConnellsville-Malta, Ohio.

Fifth prize winners were: Public Service Electric & Gas Company, Newark, N. J.; Natural Gas Company, Wheeling, W. Va.; North Penn Gas Company, Port Allegany, Pa.; United Gas Public Service Company, Opelousas, La., and Iowa-Nebraska Light & Power Company, of Lincoln, Nebraska.

The cash prizes for companies winning third, fourth and fifth places were $100 each.

Honorable Mention

Companies receiving honorable mention were: Boston Consolidated Gas Company, Kings Appliance Company, Brooklyn Union Gas Co., Brooklyn Borough Gas Co., Consolidated Gas Company of New York. Milwaukee Gas Light Company, Minneapolis Gas Light Company, Public Service Electric & Gas Company (Jersey City, N. J.), Springfield (Mass.) Gas Light Company, Southern Counties Gas Company (Orange Co.), Santa Ana, Calif., Southern Counties Gas Company, Pomona, Calif., Natural Gas Co., Inc., Monroe, La.; Nashville Gas & Heating Co., Nashville, Tenn., Community Natural Gas Co., Sweetwater, Texas, Palestine (Texas) Light, Heat & Power Co., Community Natural Gas Co., Vernon, Texas, Hornell Gas Light Company, Hornell, N. Y., Ohio Fuel Gas Company, Frazeysburg, Ohio, Gas and Electric Appliance Co., Caldwell, Ohio, and Virginia Gas Distributing Company, of Waynesboro, Va.

Prizes of $100 each awarded for high sales records in June went to the Boston Consolidated Gas Company, New Haven Gas Light Company, Birmingham Gas Company, North Penn Gas Company, of Allegany, Pa.; Municipal Gas Company, of Denison, Texas, and Municipal Gas Company, of Ennis, Texas.

Formulas for Designing Natural-Gas Pipe-Line Systems Consisting of Parallel Lines

(Continued from page 18)

whereas the cost of each per cent for the 50 per cent increase in delivery is

$$\frac{1{,}830{,}000}{50} = \$36{,}600.$$

Summary

The formulas presented in this report are derived from Weymouth's formula for the flow of natural gas through pipe lines. The use of these formulas, along with a series of curves as shown in figure 1, aids materially in the calculation of problems dealing with the design of parallel lines. Examples are given in the report to show the application of the formulas. Some of the economics involved in the design of parallel lines (as indicated by the formulas) are discussed, together with examples based on comparative cost data. However, for any particular gas-transmission system other factors than those considered may enter into a determination of the most economical design of parallel lines. For instance, only a limited length of the pipe line right-of-way may be easily accessible and satisfactory for laying pipe lines, whereas the remainder of the pipe line may transverse swamps, mountains, or areas of corrosive soil, where the cost of construction and maintenance is much higher and paralleling this section may not be economical.

High Pressure Storage

(Continued from page 12)

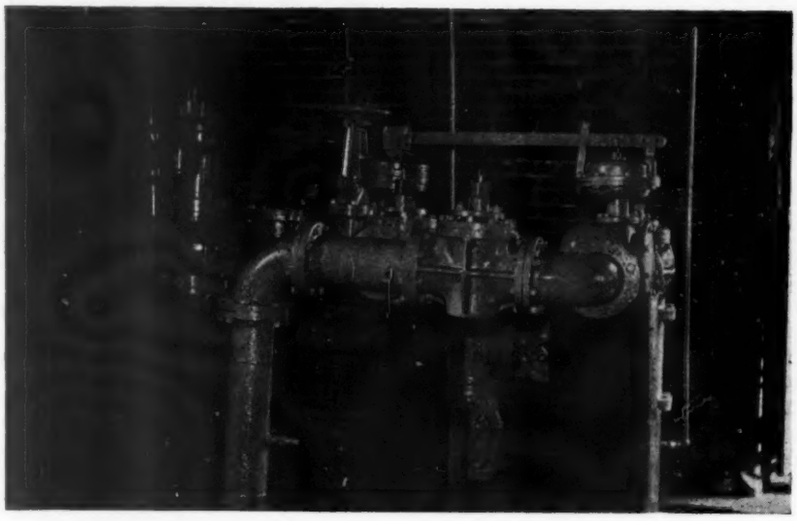
maximum pressure for which the holder is designed. To limit the maximum storage pressure a governor may be substituted for the check valve or placed adjacent to it. This regulator is designed to close when the pressure on its outlet or storage pressure reaches a predetermined amount and may be designed to also close when its inlet or transmission line pressure reaches a certain predetermined minimum. Combining the two purposes eliminates the necessity of two separate governors to prevent filling storage when transmission line pressures are lower than desirable and to prevent safety valves from exhausting gas to the atmosphere. For each maximum and minimum limit control regulator there is a range of pressures beyond which the regulator will not operate satisfactorily. When two regulators are installed for the purpose of controlling outlet and inlet pressures they should be separated by as great a distance as possible to prevent any pumping or "hunting" action which may occur when the pressure actuating both approaches the settings at which complete shut off occurs. The advantages of having two separate governors for maximum and minimum control are a greater flexibility in the differential between the settings of the two governors and the ease with which changes may be made.

A recent development in high pressure control is the use of a loading device actuated by the rate of gas flow through the governor for boosting pressures on the outlet of the line regulator. Loading devices are an adaption of low pressure district governor practice and has the advantage in common with low pressure of decreasing leakage during off peak hours and lessening governor blows together with the loss of gas from governor blows. This loading device has been used only on governors feeding into the distribution system.

On any system of controls which provides for a complete automatic valving off of the transmission from the storage or distribution during periods of each day a regulator should be installed fed direct from the transmission main into the distribution system being in the nature of a by-pass governor. The pressure at which this governor opens should be at least two pounds but preferably more below the opening pressure of the regular distribution regulator. The purpose of the by-pass regulator is to prevent poor consumer service should the storage pressure go below the minimum desirable or should the regular governor stick in a closed position due to gums, freezing, etc. Such a by-pass regulator should also be placed as a by-pass across meters of either the rotary or displacement types to guard against a stoppage of flow should the meter fail mechanically from gum or foreign matter causing it to stick or freezing. The pressure charts at the meter location will clearly indicate when the regulator is by-passing the meter and provide a means of considering the quantity of gas by-passed.

A few installations have been made of storage tanks which can withstand pressures of 150 pounds. Compressors have been located at the storage station to fill such tanks during off peak demand periods of the transmission line or when the pressure on the transmission line is above a predetermined amount. Starting and stopping of these compressors may be automatic and mechanical difficulties apt to occur due to overheating of any section of the compressors are minimized by the installation of thermostats at vital points which will stop the compressor if the temperature becomes excessive. Automatic controls also provide for stopping the compressor should the belt drive break, oil levels become dangerously low and similar features.

Such elaborate automatically controlled installations are intended to eliminate the necessity of continuous supervision by an operator. However, considerable operating attention and maintenance are required. The more simple pressure controlled methods will be found to give excellent service at low maintenance cost and will follow the general policy, repeated under various distribution phases, of simplification. Few of the fully automatic and rather elaborate installations would be necessary in any one territory compared with the number of stations with only holders and governors and, therefore, the specialized nature of the maintenance and repair on fully automatic compressors would result in high maintenance costs. While the initial installation of compressors and tanks designed to be fully automatic and eliminating continuous attendance may be lower than greater capacity storage with pressure controlled regulators the maintenance and operating costs over a period of years usually favor the simpler layouts.



Line regulator having electrically operated time control valve used in conjunction with check valve.

Co-Operate with NHA

The National Housing Act passed by Congress on June 18th is of special interest to gas utilities. This bureau is concerned with the remodeling of existing houses and the construction of new houses. All the business of NHA will be turned over to a new agency, the Federal Housing Administration, with James A. Moffett as the administrator.

There are millions of domestic gas burning appliances now in use which are practically obsolete. When a home is being remodeled is the time to put in that new gas range, water heater and house heating equipment. A large percentage of new homes will be constructed in territory that has gas service as well as homes to be remodeled.

Gas companies should cooperate to the fullest extent in this work. They can contact the architects, the builders and the home owners. A remodeled house will not be complete unless old antiquated gas appliances are replaced with new models.

Reminiscences

(Continued from page 24)

companies to sell and install it. Wishing to give the furnace a working test before either taking up its sale or turning it down, the Newark Gas Light Co. had one installed in the house which I occupied and I used it for two heating seasons. At the start it was not provided with thermostatic control, but this was soon found to be necessary for economical and satisfactory operation and was added within a month after the beginning of the test.

The furnace was well designed and used gas very efficiently. The test showed that 22,000 cub. ft. of 21 candle-power gas, having a calorific value of probably 650 b.t.u., was equivalent to 2240 lb. of good anthracite coal. No trouble was experienced with the furnace and the heating of the house was very satisfactory, but since coal at that time and place cost only $5.00 per net ton and the annual load factor, as developed by the results of the test, did not seem to justify any substantial reduction in the price of $1.25 per 1000 cub. ft. of gas, it was thought impossible to secure any house-heating customers and no attempt was made to do so. Also in 1896 people had not been sold on the idea of paying for convenience and any new fuel had to make its way entirely on the basis of cost as compared with its competitors.

A furnace of either this same make or one similar to it was tested at the same time in Milwaukee with practically the same results.

Atmospheric Burners

As luminous flame burners were replaced by atmospheric ones it became advisable to increase the street main pressures, but some of the older executives had great misgivings as to the effect upon the item of unaccounted-for gas of such *high* pressures as 5 in. or 6 in. and much pleading was required to obtain their permission to make the change. In connection with the proposal to distribute a special fuel gas it was suggested that because of the lower calorific value and larger demand expected it might be necessary to operate with the *very high* pressure of 10. in.

Up to this time town gas was still used almost entirely for domestic purposes, but just before 1900 a start was made in the cultivation of the industrial heating field. In industrial cities, such as Milwaukee and Newark, the market for this purpose was developed in a few years to such an extent that when the panic of 1907 was in full swing their total sales of gas showed an actual decrease for several months as compared with the sales for the corresponding period of the preceding year. This had never happened, for Newark at least, while sales were entirely for domestic purposes. In the hard times of 1893 to 1897, for instance, the sales of gas showed an increase each year, although in one or two of them there was a sharp decrease in the rate of increase.

With the change from the use of town gas for lighting to that for cooking, water heating, house heating and industrial heating the maximum hour no longer comes in the late afternoon or early evening nor the maximum day on Christmas Eve and the ratio between annual and maximum day's sales has increased from about 200 to between 260 and 280. This is subject to the exception that if there is a house heating load which forms an appreciable percentage of the total, as is the case in some places in the southern part of the country, this ratio falls below 200.

Having seen gas companies come safely through the experience of losing entirely their original business of selling gas for lighting, because they went out and secured a larger business in selling gas for cooking and other heating purposes, I look forward with confidence to a prosperous future for those companies which recognize the severity of present day competition and, because of this recognition, push their business with the energy and skill always possessed by the leaders of the industry.

Restorage of Natural Gas

RECENT additional tests have established the practical usefulness of the method originally suggested in April by Frank L. Chase, of Dallas, Texas, for restoring natural gas back into the ground as a means of preventing a daily wastage of one billion cubic feet of gas a day in the Texas Panhandle. Mr. Chase is vice-president of the Lone Star Gas Company and chairman of the Natural Gas Department of the American Gas Association.

The wastage of natural gas in the Panhandle field is the result of a state law, commonly called the "sour gas" law, which permits gasoline stripping plants to extract natural gasoline from gas and blow the residue, about 97 per cent. of the heating value, into the air. Of four trillion cubic feet of gas produced, three trillions have been permitted to go to waste, according to the best estimates. To reduce this astronomical figure to an understandable basis, the wasted gas would heat Texas homes and cook Texas meals for seventy-seven years, at the present rate of consumption.

As an important step in the solution of this appalling waste, Mr Chase suggested that the residue gas should be returned from the stripping plants back into the ground. His idea was put to prompt and successful demonstration in Wheeler County, Texas, where engineers of the Lone Star Gas Company returned 100 million cubic feet of gas into the ground in six days without mechanical pressure. Subsequent tests added to the success of the original experiment.

"When we offered restoration of gas to the ground as a solution of the wastage problem in Amarillo last April, we had only a theory," Mr. Chase reports. "Now we have proven by actual experience that restoration is practical. We believe it is the one thing which will solve the prodigal wastage of a valuable natural resource in this state."

Representatives of gas companies in Texas and Oklahoma, and E. L. Rawlins, chief natural gas engineer of the United States Bureau of Mines, met recently in Dallas to study data obtained from the gas restoration method. Mr. Rawlins said he would seek immediate approval of his plans for further experimentation from Bureau of Mines officials in Washington. In the tests carried on to date, gas was forced back into the ground with natural pressure of the field. Subsequent experiments will be conducted with mechanical compression of a much higher pressure.

Commenting editorially on waste of gas in the Panhandle, the St. Louis Post-Dispatch says:

"We call attention to this situation to illustrate the daffiness of our civilization. To the City of St. Louis, hardly habitable during the winter because of the smoke pall from soft coal, cheap natural gas would be a godsend. Yet in Texas it is being blown to the winds, irrevocably lost. For what purpose? To obtain a half gallon of gasoline per thousand cubic feet of gas. And the trouble with the gasoline business is that it is cursed with over-production. It all just doesn't make sense."

BOOK REVIEW

Steam and Gas Power. By W. H. Severns and H. E. Degler. John Wiley & Sons. 1933. Second Edition. 480 pages. $4.00 plus postage.

The second edition of "Steam, Air and Gas Power" is completely up-to-date, all obsolete material having been removed. New descriptions and new illustrations of recent power plant equipment have been included. A large number of new problems have replaced those of the first edition. The scientific and engineering symbols and abbreviations used in this book are in general accord with the American Tentative Standards approved by the American Standards Association; with the exception of the use of periods. The book describes briefly and clearly, typical and representative equipment and explains the theory of such machines and devices.

Gasverbrauchgeräte (Gas Appliances), Otto Huppert. (1934.) Being Vol. 33 of Kohle, Koks, Tees. 184 p., 190 ill., 15 tables. Published by W. Knapp, Halle. Paper cover, 9.25 RM; Bound, 10.50 RM.

Very often our complacency is shattered by a work like this. The magnitude of our industry is often taken as evidence of perfection of all details of design and construction rather than as a reflection of the great national resources at our command at a remarkably low cost. However, the Gas Industry in other countries is faced by more difficult problems. One of these is the fact that based on the gold standard, the costs of gas fuel vary but little from the rates in effect in the U. S. However, the income of the consumer in these countries is much less and hence the cost of gas service takes a larger percentage of this and the marginal income from which appliances are purchased is extremely low. This means that a great deal of fundamental research has been carried on to improve the efficiency of gas service and particularly cooking appliances.

The subject matter of the book divides roughly into the description of principles and methods of design and the application of these to appliance construction. The first classification is of great value, inasmuch as the results of otherwise involved and technical studies have been simplified and summarized into brief statements and clear and understandable drawings and pictures. The features that stand out are the descriptions and pictures of the different variations of the range business, the flame patterns of some of these which show remarkably well the characteristics of some and the results of misapplication.

The historical discussion of water heater development and the most complete (Fig. 117) presentation of the relation between the amount of heating surface and efficiency of water heaters is also a high light.

The second rough division of the context relating to description of appliances is much inferior being in many instances merely a catalog reference, except where some unusual application is described.

The serious designer can learn much from the cuts, pictures and explanations and this book could well be part of every appliance manufacturer's development reference.

The New Modern Gasworks Practice, Volume One, by Alwyne Meade, Assoc. M. Inst. C. E., Engineer of the Popular Works of the Commercial Gas Company, England. Approximately 534 pages. Eyre and Spottiswoode, London, Publishers—Price 50s.

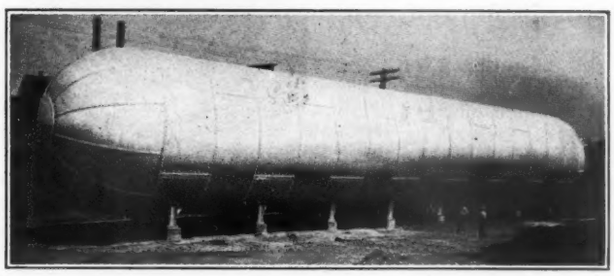
Although written around British gas works practice, gas engineers in the United States will find it a valuable reference book. It is profusely illustrated with charts, tables, diagrams and photographs.

In this book the author discusses the design and construction of gas works, carbonizing plants and mechanical handling of materials.

This is the third edition, the first of which was published in 1916 and was revised in 1921.

The revolutionary changes in the technique of gas manufacture in the last ten years made the information in previous editions inadequate and Mr. Meade has contributed to gas literature by compiling this revised edition.

REPEAT ORDERS Bespeak SATISFACTION



1929 200,000 cu. ft. volumetric capacity "Stacey Bullet" 25' dia. by 118' for operating pressure of 5 to 60 lbs. placed in service in Florida.

1934 To care for additional load, an additional tank identical in every detail, is ordered.

This is but one example which illustrates complete satisfaction "Stacey Bullet" high pressure tanks have given under widely divergent weather and operating conditions.

For further information on High Pressure "Bullets," Low Pressure Telescopic, Stacey-Klonne Dry Seal Holders, please address

STACEY BROTHERS
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STACEY-KLONNE GAS HOLDERS
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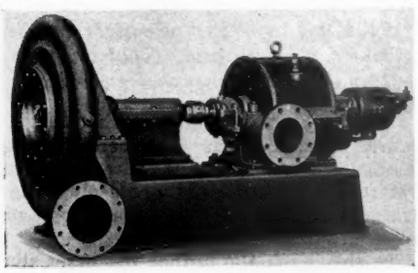
"STACEY BULLET" HIGH PRESSURE HOLDERS
PURIFIERS

EQUIPMENT NEWS

New Centrifugal Compressor

A recent addition to the line of centrifugal compressors and exhausters built by the Roots-Connersville Blower Corp. of Connersville, Ind., is the single-stage Type 'OIB' unit. In this design, the machines have their own shafts and bearings and are suitable for direct connection to standard electric motors or steam turbines, without special shaft extensions. They are also adaptable to V-belt or flat belt drive.



Impellers are furnished in aluminum or carbon steel in the standard construction, but special alloys can be supplied where conditions require. Open-type impellers are used in the smaller sizes, with closed type for larger machines. Each impeller is designed to meet specified requirements.

Casings are ordinarily made of cast iron, but special alloys, to resist corrosive or abrasive action, can be supplied on order at proportionately higher prices.

Type 'OIB' units have a sturdy bearing stand that fits them for heavy duty service in a wide variety of industrial applications, according to the manufacturers. Anti-friction bearings are used in smaller sizes, and sleeve bearings in the larger.

Literature on Bronze-Welding

By reason of recent important advances in the use of the oxy-acetylene bronze-welding process, The Linde Air Products Company, 30 East 42nd Street, New York, N. Y., has issued a new edition of its eight-page pamphlet entitled, "The Progress of Bronze-Welding." Similar in form to previous editions, it contains a comprehensive and instructive story of bronze-welding in all its phases.

The subject matter is arranged so that procedures for work on cast iron, malleable iron, steel and wrought iron, copper, and brass and bronze are each discussed in a comprehensive manner. A special section is devoted to the building-up of worn surfaces, which is one of the most important uses of bronze-welding today. Plentiful illustrations help to portray what can be accomplished in the various industries by the use of this process.

In order to satisfy a growing desire on the part of many to know more about the metallurgical aspects of bronze-welding, the Linde Air Products Company has added another five-page pamphlet to its technical literature. This pamphlet, entitled "The Principles of Bronze-Welding", discusses in an authoritative way the compositions and strength characteristics of bronze-welding rods, the underlying theory of the flowing of bronze-weld material, and certain important elements of welding techniques.

Both of these pamphlets are sure to be of great interest to students, welders, engineers, technical men and executives. Copies will gladly be furnished upon request.

New Heating Booklet Issued by American Radiator

A fifty-six page booklet covering the subject of heating from a review of the four methods of radiator heating and a discussion of heating principles to a summary description of all the products made by American Radiator Company has just been published by that company under the title "Ideal Heating for Cottage or Skyscraper."

Intended as an aid for contractor-dealers in selling, the booklet replaces the literature of the same name formerly published by the company. Printed in three colors, it has a five-color cover of modern design, in black, white, gold, gray and tan.

After discussing the advantages of radiator heating, it explains in simple language the basis upon which efficient heating systems are built. Describing the four methods of radiator heat, hot water, steam, vapor and vacuum, it enumerates briefly the principles on which each operates. A description of each of the company's products, including boilers, radiators and accessories, follows.

Published to serve as a guide for home and property owners, the booklet is written in simple consumer terms, and covers both the general subject of heating and the individual product from the viewpoint of the heating prospect.

Gas Refrigerator Sales Doubled

Electrolux Refrigerator Sales, Inc., sold twice as many gas refrigerators during the six-month-period ending on June 30, 1934, as in the similar period of 1933, it was announced by F. E. Sellman, vice-president of the company from its eastern headquarters, 51 East 42nd Street, New York City.

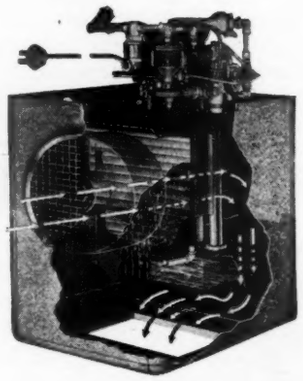
"Sales of Electrolux air-cooled gas refrigerators for the first six months of the present year not only double those of the first half of last year," Mr. Sellman said, "but these sales are an all-time record for any six months in the history of the company. This record is a clear indication of the growing acceptance of gas refrigeration on the part of the public. The sales were made in practically all sections of the country."

Electrolux gas refrigerators are manufactured by Servel, Inc., of Evansville, Indiana, of which Electrolux Refrigerator Sales, Inc., is a subsidiary.

Bryant Announces Gas-Burning Humidifier

The Bryant Heater Co., Cleveland. O. at its sales-convention, announced and exhibited a gas-burning humidifier unit designed to make winter humidifying practical at reasonable cost in any home enjoying gas service.

The Humidifier is designed for basement installation, with a distributing duct leading to an outlet grill on the floor above. It consists, essentially, of a fan blower, a removable screen filter which is constantly washed by warm



water; a heater with a surrounding air-chamber; together with all necessary controls. The cabinet is delivered complete ready for installation and connection to gas and water lines and the distributing outlet. The capacity of the unit is ample for supplying proper humidity to the great majority of residences.

It opens up a market to gas companies which includes not only homes heated by gas but makes a prospect of every coal and oil user in its territory. Customers who install the Bryant Humidifier should find it an effective means by which to "sample" air conditioning by gas, and experience its comfort and convenience.

Descriptive literature will be forwarded by the Bryant Heater Co., of Cleveland, O.

NEWS *of the* GAS INDUSTRY

House Heating Campaign in Pittsburgh, Pa.

Equitable Gas Company, a unit of the Philadelphia Company system, Pittsburgh, is cooperating with other gas companies in the Pittsburgh district in a major gas conversion burner house heating campaign which started July 16 and will continue until November 1. The company will contact a selected list of 15,000 gas house heating prospects.

An extensive newspaper advertising, radio and direct mail promotional campaign has been launched, featuring especially a nine months' demonstration trial offer under a $2 a month rental plan which will precede a lease purchase contract for the equipment.

Equitable Gas Company plans to use 100,000 mailing pieces to circularize its customers, telling of the advantages of heating with gas. Special displays will be erected in the main office building and at various other points on property of the Philadelphia Company system to increase support of employes and obtain public interest.

Cooperation is being extended to all heating contractors, department stores, appliance stores and other sales outlets in the Pittsburgh district which may become interested in the sale of conversion burner equipment.

Advanced Course in Welding Engineering

A special five day course which began on July 23rd in welding engineering is being offered in Cleveland by the John Huntington Polytechnic Institute in cooperation with The Lincoln Electric Company. The course, being repeated at this time due to increased activity in the welding industry and to the demand for an intensive advanced training course, will be conducted once each month except during August of this year. This course will provide engineers, welding supervisors and foremen an opportunity for intensive study of the practical and theoretical sides of welding. Engineers from three foreign countries and 15 states attended one of the recent sessions of this course.

Day sessions will be held between 10:30 A. M. and 4:30 P. M. at the plant of The Lincoln Electric Company which has offered the facilities of its welding school under the direction of Arthur Madson and Dean Newton. Evenings between 7:30 and 9:30 will be devoted to lectures and discussions at the John Huntington Polytechnic Institute.

The course will cover the following subjects: value and use of the shields; arc; calculation and distribution of stresses in welded joints; study of polarized light and rubber weld models; penetration; designing for arc welding; organization of welding departments and estimating welding costs, etc.

This course is not to be confused with the regular Lincoln Welding School which has been in session regularly since 1917 when it was first inaugurated.

Complete information on the five day course may be obtained from E. W. P. Smith, Welding Engineering Department, John Huntington Polytechnic Institute, Cleveland, Ohio.

National Safety Council Issues Report for 1933 on Accident Experience of Manufactured and Natural Gas Utilities

Reductions of 7 per cent in frequency and 17 per cent in severity from 1932 to 1933 were made by the public utilities, according to a survey recently completed by the National Safety Council. These findings are based on the records of 488 organizations reporting for both years, whose employees worked over 600,000,000 man-hours per year. This improvement means that the public utilities industry has reduced both rates every year since 1926.

The Safety Council survey divides the industry into several divisions, as follows: electric, manufactured gas, natural gas, gas and electric, telephone and telegraph, and miscellaneous public utilities.

In 1933, manufactured gas companies made an outstanding achievement by decreasing the severity rate of disabling injuries 64 per cent in comparison with 1932. The improvement in frequency, however, amounted to only 4 per cent. These reductions resulted in new low levels for both frequency and severity.

While all types of injuries decreased in frequency during 1933, the largest reduction occurred fatalities; in fact, the manufactured gas division established the lowest rate for such injuries since 1927. This large reduction accounts for most of the improvement in the total severity rate, though permanent partial and temporary disabilities were also somewhat lower in severity. Fatalities, however, are still numerous compared to other industries.

The 1933 experience of the manufactured gas division in severity shows up favorably in comparison with records of other utilities. Results from the standpoint of frequency, however, were not so good; all public utilities averaged 8.70 for frequency in comparison with 11.36 for manufactured gas companies.

The large reduction in severity from 1932 to 1933 by manufactured gas companies easily exceeded the decreases in other divisions and is responsible, to a considerable extent, for the improvement of 17 per cent made by all public utilities. The entire industry, however, reduced frequency 7 per cent against 4 per cent for manufactured gas companies. Middle-sized units in the manufactured gas division have higher rates than any other size group, averaging 16.79 for frequency and 1.74 for severity. Small organizations, also, will have to make further improvement in frequency to equal the rates achieved by large companies; small units, however, do have the lowest 1933 severity rate.

Accidental injuries among employees of natural gas companies reached new lows in frequency and severity during 1933. Reports from 86 organizations, that worked over 39,600,000 man-hours during the year averaged 10.93 for frequency and 1.23 for severity. Sixty-five of the eighty-six organizations in the natural gas division reports for both 1932 and 1933, and succeeded in reducing frequency 9 per cent and severity 24 per cent between the two years.

Figures in the survey showed that the frequency of fatalities decreased 12 per cent, and permanent partial disabilities, next in importance, were 15 per cent lower in frequency and 47 per cent lower in severity. The smallest improvement was made in temporary disabilities.

The 1933 experience of natural gas companies compares favorably with the records of other types of utilities. The entire industry averaged 8.70 for frequency in comparison with 10.93 for natural gas companies, but in severity, the rate of 1.23 for the latter is below the general average of 1.53. Natural gas companies had better frequency rates than manufactured gas organizations; in severity, however, natural gas companies were higher.

Convention Calendar

September

1–4 International Gas Association, Zurich, Switzerland.

9–14 American Chemical Society Division of Gas and Fuel Chemistry, Fall meeting, Cleveland, Ohio.

11–13 Pacific Coast Gas Association, annual convention, Hotel Del Monte, Del Monte, Calif. Clifford Johnstone, managing director.

October

Week of 29th—American Gas Association Convention and Exhibition, Atlantic City, N. J.

Increase in Sale of Electric and Gas Appliances

The Philadelphia Company's sales of electric and gas appliances in the Pittsburgh district led all subsidiaries of Standard Gas and Electric Company for the first six months of 1934 with a volume of $649,000. This is a 30 per cent increase compared with 1933. All properties in the Standard Gas and Electric Company system, with one minor exception, increased household appliance sales for the first half of the year, the total increase amounting to $552,000, or a gain of 41 per cent. The California Oregon Power Company's appliance sales gained 112 per cent; Mountain States Power Company, 84 per cent; Wisconsin Public Service Corporation, 62 per cent; Southern Colorado Power Company, 56 per cent; San Diego Consolidated Gas and Electric Company, 36 per cent; Northern States Power Company, 33 per cent.

Increase in Sale of Appliances

The Birmingham Gas Company, Birmingham, Ala., to July 1 this year sold nearly 100 per cent more appliances than for the same period a year ago and has added some 3,000 meters to the lines according to a statement by Charles B. Gamble, vice-president.

"A year ago our chart line was slowly falling," he said. "Now the exact reverse has set in. Without figures to refer to, it is approximately correct and entirely conservative to say that our meters in use now are 3,000 above what they were this time last year. This amounts to an increase of 9 per cent, not a staggering, but a most reassuring figure."

Indiana Municipal Gas Plants Plan To Test Tax Laws in Court

A legal battle, expected eventually to result in a supreme court ruling on the constitutionality of the Indiana Municipal Utility tax law is forming following a meeting in Indianapolis of representative city officials of virtually every city in the State having municipal utilities. Appealing to the State Tax Board to set aside and cancel assessments on all Indiana municipal plants, a total of 85 of them, will be the first move.

The tax board recently completed assessment of more than 1000 of the municipal plants as provided in the 1933 Legislature. In their petitions the plants claim "the new law is unconstitutional; that municipal utilities are exempt from taxation and that the assessments fixed by the board are high and unreasonable. The taxes on assessments fixed this year are not to be paid until next year. Andrew Ketchum, secretary of the tax board, said a hearing on the petitions to cancel the assessments would be held probably late in July or in August.

Included among the cities appearing and petitioning were: Bedford, Shoals, Rochester, Paoli, Decatur, Petersburg, Peru, Linton, Portland, Auburn, Columbia City, Rockyville, Rensselaer, Sherer-ville, Delphi, Angola, Elkhart, Bremen, Bicknell, Chalmers, Fort Wayne, Huntington, Goshen, Washington, Hartford City, Hammond, LaPorte, Dyer, Monon, Remington, Griffith, Bloomington, Galveston, Brazil, South Whitley, Whiting and Ligonier.

It has been the contention of executives of privately owned utilities that the Indiana Municipal Utilities would be unable to offer such low rates if they had to pay State and county and other taxes levied on the private properties. Much of the agitation for more municipal plants has come about from the difference in rates charged by municipal and private plants.

The cities concerned, however, are building up a war fund and virtually all of them are paying an assessment of one-twentieth of one percent of the gross income of their plants during 1933 into a fund to fight the case.

The Indiana State board of tax commissioners, has completed its work of valuing for taxation 260 municipal utility plants in Indiana. The board announced an appraised value for tax purposes of $35,714,660. The appraisals were made in conformity with provisions of a 1933 act making the properties subject to county and state taxation to which they previously had been exempt.

New Gas Rate for Nappanee, Ind.

The Northern Indiana Public Service Company has announced a new gas rate for Nappanee, Ind., which will reduce the rate average about 13 per cent. The old $1 service charge in addition to gas consumption is discontinued and the new rate will be $1 for the first 500 cubic feet, 14 cents a 100 cubic feet for the next 1,500 cubic feet, 10 cents a 100 for the next 300 cubic feet and 9 cents for the next 1,500 cubic feet. The minimum will be $1 a month.

Natural Gas for Knoxville and Other East Tenn. Cities in Near Future

Tennessee railroad and public utilities commission on July 6 granted a 90-day tentative permit to Sunbright Pipeline Co., enabling the corporation to complete financial arrangements for supplying natural gas to Knoxville and other East Tennessee cities.

Sunbright attorneys claimed the company had arranged tentatively for $1,000,000 financing that would permit them to distribute natural gas from fields in Morgan County, Tennessee, and Southern Kentucky.

The company proposes to supply Knoxville, Harriman, Kingston, Rockwood and Oliver Springs.

Commissioners indicated they would grant the petition when company representatives presented definite proof of sufficient finances.

Broadcasts Value of A.G.A. Approval Seal

The value to women purchasers of the American Gas Association Laboratory seal was emphasized June 20 over a nation-wide radio hook-up by Miss Aubyn Chinn, chairman, Home Economics in Business Section, American Home Economics Association, and Director of Health Education, National Dairy Council, Chicago.

The occasion was an "advertising clinic" at the final session of the thirtieth annual convention of the Advertising Federation of America held at the Hotel Pennsylvania, New York, in which John B. Kennedy, writer and radio commentator, interviewed twelve outstanding merchandisers, advertisers and economists of the country on advertising and its relation to commerce, industry and the consuming public.

Standard G. & E. Co. Show Healthy Increase of Gas Customers

Subsidiary and affiliated public utility companies of Standard Gas and Electric Company gained 44,068 customers during the twelve months ended May 31, 1934, an increase of 2.80 per cent. This contrasts with a loss of 34,673 customers during the calendar year 1932, and a gain of 12,728 customers in 1933. As of May 31, 1934, and gas customers increased 9,027, or 2.05 per cent, and gas output was up 8.82 per cent to a total of 37,289,609,000 cubic feet.

Gains in the Philadelphia Company group, Standard Gas and Electric Company's largest subsidiary, serving the greater Pittsburgh district, indicate the extent of business improvement in this great industrial territory. Total gas customers increased 4,359, an increase of 2.60 per cent.

New Plans Suggested to Finance Taking Over Citizens Gas Co.

With the failure of Congress to enact legislation to enable the Indianapolis, Ind., utilities district to obtain a PWA loan with which to acquire the property of the Citizens' Gas Company, it is understood the trustees of the district are preparing to take new steps to provide financing. These steps may involve the issuance of revenue bonds against the property to retire the outstanding obligations.

In this connection, it also is understood that the utility district may ask for bids on natural gas with a view to supplying this type of fuel to industrial users. Individuals, groups and public agencies which have been active in the long fight to preserve the company as a municipal plant, though it has been operated privately about 30 years, have urged repeatedly the utmost caution in consummating plans for the use of natural gas.

SUPERIOR

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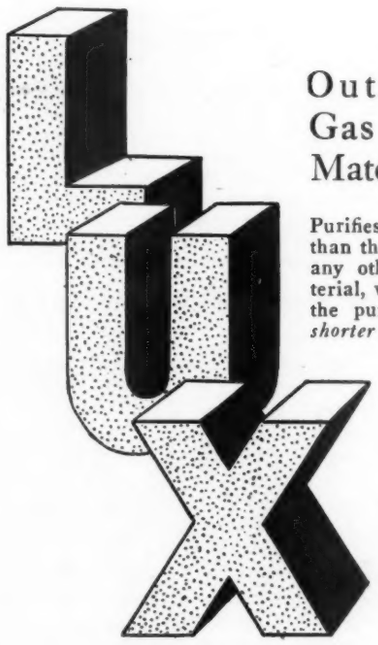

The Outstanding Gas Purifying Material » » »

Purifies *much more* gas than the same quantity of any other purifying material, while it also effects the purification in much *shorter time.*

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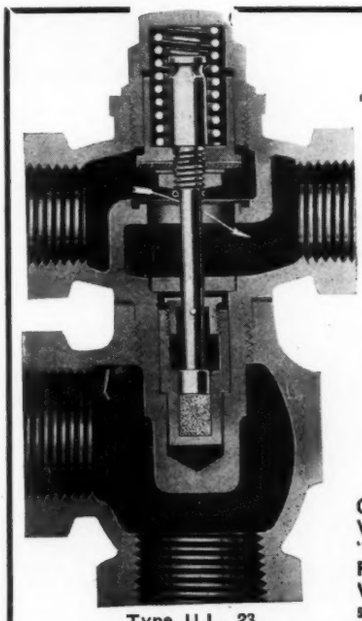

Type U.L. 23
Emergency Gas Shut-off Valve

The LoveKin "Universal" Valve is designed to ***Protect*** all types of Automatic Gas Water Heaters from overheating

Operation is very simple; i. e., When water is overheated to "danger point," the Chemical Fuse softens, causing the Gas Valve to snap shut. Re-servicing is a simple and inexpensive matter.

Write for details and prices.

"Approved and used by numerous Gas Companies"

KITSON CO.
WESTMORELAND & STOKLEY STS.
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Personals

J. J. Bartholomew retired from active service July 1, after more than 34 years continuous service in the Purchasing Department of U. G. I. Co., Philadelphia, Pa.

Mr. Bartholomew entered the employ of the company February 12, 1900, after having served ten years as secretary and treasurer of John L. Gaumer Company, afterwards Biddle-Gaumer Company. His keen sense of justice in dealing with vendors and his kindly consideration in all matters pertaining to the business have endeared him to all with whom he came in contact.

Kenneth Williams has been appointed manager of sales for the department of engineering and construction of Byllesby Engineering and Management Corporation, Chicago, Ill.

The engineering department of the Byllesby corporation, which has for some years practically confined its services to the subsidiaries of Standard Gas and Electric Company, is expanding its activities to include general engineering practice for independent clients. It is in this phase of the corporation's activities that Mr. Williams will be associated.

Henry Obermeyer of the Consolidated Gas Company, New York, was elected President of the Public Utilities Advertising Asso. at the recent meeting of the Association in New York.

Charles E. Brinley, president of the American Pulley Company, of Philadelphia, was recently elected to the U. G. I. Board of Directors to fill the vacancy caused by the death of R. B. Mellon.

Mr. Brinley was graduated from Yale in 1900 and took an engineering degree from the Sheffield Scientific School in 1901. He at once entered the employ of the American Pulley Company and steadily rose to the top, being elected president and a director in 1919, positions he still occupies.

Mr. Brinley is a member of the American Society of Mechanical Engineers; a trustee of Drexel Institute; one of the board of managers of Western Saving Fund Society; a director of the Philadelphia Chamber of Commerce, Philadelphia Manufacturers Mutual Fire Insurance Company, Keasby & Mattison Company and Liberty Mutual Insurance Company of Boston. He is also on the board of managers of the University Hospital, Philadelphia.

In addition to being a member of the board of the Philadelphia Chamber of Commerce, he is now directing the new industrial research and development committee and bureau of the Chamber.

Frank Leckie, son of Prof. R. B. Leckie, Purdue University, Lafayette, Ind., has been appointed gas engineer in the liquified gas division of the Phillips Petroleum Company. He started his new duties on August 1, and has his headquarters in Detroit. Since his graduation from Purdue University in 1933, Mr. Leckie has been with the Autogas Corporation, Chicago, as engineer in charge of research.

William E. Leverette has been appointed sales manager of the Nashville Gas & Heating Company, Nashville, Tenn., to succeed the late Charles L. Ridley, it has been announced by S. E. Linton, president of that company.

Mr. Leverette comes to his new position from the New Bedford (Mass.) Gas & Edison Lighting Company, where he was sales manager. Previously he held similar positions with the Alabama Power Company and with the Broad River Power Company of Columbia, S. C.

Dale D. Merchent, manager of the Valparaiso district of the Northern Indiana Public Service Co., Hammond, Ind., was recently appointed manager of the Elkhart district to succeed **M. C. Hansen,** who will be transferred to the South Bend district. **Roger A. Bozarth** of South Bend has been assigned duties at the general offices of the company at Hammond.

Carl A. Rees, Michigan City superintendent of the company, has been promoted to the managership of the Valparaiso district to replace Mr. Merchent, and **Walter H. Hathaway,** assistant general foreman of the electric operating department at Plymouth, has been assigned the position of superintendent of the Michigan City district to succeed Mr. Rees.

Obituary

DR. WALTON CLARK

Dr. Walton Clark, former vice president of the United Gas Improvement Company, Philadelphia, Pa., and former president of the Franklin Institute of Pennsylvania, died July 29th at his home, Chestnut Hill, Pa.

Dr. Clark was born in Utica, N. Y., April 15, 1856 . He was educated in the public schools of Utica. At the age of seventeen he became associated with New Orleans Gas Light Co. in New Orleans, La., going to Chicago, Ill., in 1887, where he was engaged in the same line of work, and to Kansas City in 1888. The same year he removed to Philadelphia to accept a position with The United Gas Improvement Company, subsequently advancing to the position of vice president of that company in 1903. On July 11, 1923, he retired as vice president and was made consulting engineer.

In 1904 the Stevens Institute of Technology conferred upon him the honorary degree of M. E., and in 1911 the University of Pennsylvania conferred upon him the honorary degree of Doctor of Science.

Dr. Clark was elected President of The Franklin Institute of the State of Pennsylvania in 1907, and continued in the presidency for seventeen years.

He served as president and director of various companies engaged in public utility work. He was at one time president of the American Gas Light Association, and later of the American Gas Institute. He was a member of the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Society of Mining & Metallurgical Engineers, and other scientific bodies. He was a member of the Board of Trustees of several educational institutions. He was active in the organization of a free correspondence school for gas works employees, and was chairman of the Board of Trustees for twenty-five years.

CHARLES R. PRICHARD

Charles R. Prichard, vice-president and general manager of the Lynn Gas & Electric Co., died at Beverly Hospital, Beverly, Mass., June 25 at the age of fifty years. He had occupied his position with the Lynn Company since April 1, 1925. He was the son of the late Charles F. Prichard who held the same position for many years.

Mr. Prichard was born in Lynn and received his early education there. He was graduated from the Massachusetts Institute of Technology and in 1905 became treasurer and manager of the Beverly Gas and Electric Co., remaining there for about fifteen years. In 1921 he was appointed vice-president and general manager of the Lowell Gas Light Co., and was there for four years until accepting the same position at Lynn.

STANDARDIZE

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For Quiet Operation—
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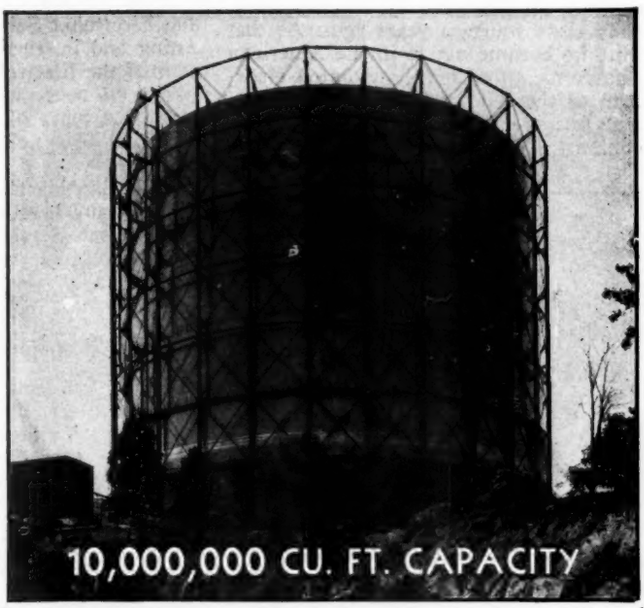

HIGH PRESSURE GAS HOLDERS LOW PRESSURE

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TRADE NEWS

Stacey Brothers Gas Construction Co. Elect Officers

At the annual meeting of Stacey Bros. Gas Construction Co., Cincinnati, O., held on July 10th, the following officers were elected: L. J. Brown, Chairman of the Board; Wayne Stacey, President and Treasurer. Paul C. Rodgers, Executive Vice-President; Ralph B. Luebbe, Vice-President in Charge of Operations; William S. Guitteau, Vice-President in Charge of Sales Development; Evan T. Davies, Secretary; C. F. Koch, Asst. Secry. and Asst. Treas.

Robert J. Canniff Appointed General Sales Manager, Pittsburg Water Heater Company

The Pittsburgh Water Heater Company announces the appointment of Robert J. Canniff as General Sales Manager with full supervision over all sales activities of the company.

"Bob" Canniff who already has assumed his new duties is well known in Utility Circles having been Western Sales Manager of the Standard Gas Equipment Corporation. His career as an appliance merchandiser of note began as Sales Promotion Manager of the Central Hudson Gas & Electric Company some fourteen years ago. At that time he became active in the American Gas Association being appointed chairman of the Sales Stimulation Committee. Largely through the efforts of this committee the Gas Industry was made to realize the importance of active selling of its service and the committee's work might rightfully be called the Industry's turning point in emphasis on selling. The first Regional Sales Conference was originated by and held under the direction of this committee.

Following his successful chairmanship of this committee, Mr. Canniff was elected chairman of the Commercial section in October 1925 and since then he has been active in commercial sections matters serving on the managing committee and advisory council for a number of years.

In 1926 he resigned his position with Central Hudson to become Western Sales Manager of the Standard Gas Equipment Corporation which position he held until his present appointment.

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INDUSTRIAL GAS BOILERS

ASME CODE
TUBULAR & FLUELESS

Sizes from one half to thirty horsepower. 100 lb. boilers in stock. Higher pressures to order.

Automatic Gas Controls
Low Water Gas Cut-offs
Boiler Feed Systems

P. M. LATTNER MFG. COMPANY
CEDAR RAPIDS, IOWA

Home Service Directors Instructed on Mechanical Details of Electrolux

Miss Jane Tiffany Wagner, Home Service Director of the Electrolux Refrigerator Sales, Inc., was hostess to thirty-two Home Service Directors of the New York vicinity at a luncheon July 19th at the Hotel Roosevelt.

After the luncheon, G. W. Anderson of the Electrolux Sales staff gave an interesting and instructive talk on the operation of the Electrolux, stressing the simplicity of construction in comparison to the other types of mechanical refrigeration and using charts to illustrate this point.

Following his talk Mr. Anderson simplified many heretofore perplexing questions, which Service Directors have been called upon to answer.

Mr. Leudemann Promoted

A. V. Leudemann, for twelve years in charge of the metropolitan New York area for Mears-Kane-Ofeldt, Inc., has been appointed general sales manager of that company. He will retain his present office in New York. Mr. Leudemann was formerly connected with the utilization department of the Consolidated Gas Company of New York.

Cecil F. Elmes Heads Valuation Department

Sanderson & Porter, New York, N. Y., announce the merger of their service for public utility valuations and that of the Cecil F. Elmes organization to constitute the valuation department of Sanderson & Porter, under the direction of Cecil F. Elmes, with headquarters in New York.

Gilmore Gas Stethoscope

E. R. Gilmore, 214 E. First St., Topeka, Kansas, has issued a pamphlet describing a gas stethoscope for locating gas leaks. It is claimed the device will detect a leak which has set up vibrations in the gas within the pipe. It is of simple construction and can be used by any one in the service department.

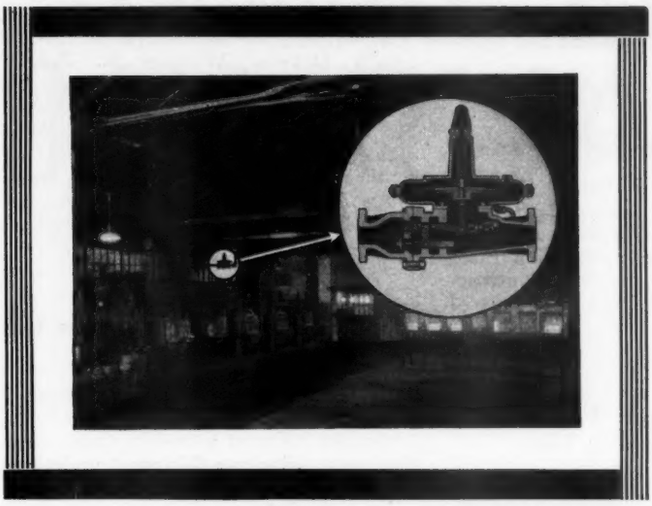
New Service Booklet by Roper

Geo. D. Roper Corp., Rockford, Ill. have issued a booklet titled "Questions and Answers," written to help the service man with servicing problems. The data is presented in the form of questions and answers, covering all parts of the range. The booklet is completely indexed.

Change in Executive Personnel of Welsbach Co.

The Welsbach Company, organized in 1887 and an outstanding contributor to the development of the gas industry, has announced changes in its executive personnel. H. N. Ramsey was elected president succeeding H. R. Martz, resigned C. A. Holdcraft succeeds A. L. Fowler as treasurer. Messrs Martz, Fowler and W. Findlay Downs retired from the Board of Directors and the vacancies were filled by the election of Messrs. Ramsey, H. W.

H. N. Ramsey



Actual photograph of REYNOLDS Double Balanced Valve Toggle Type installation in industrial plant. Inset shows enlarged cross-sectional view of unit, with placement of unit also indicated.

GREATER CAPACITY INCREASED RANGE QUICKER RESPONSE

■ REYNOLDS Toggle Type Regulators for industrial Gas Control, proved by performance in actual operation, guarantee smooth, constant outlet pressure and volume even though inlet pressure and volume are decidedly jumpy. These Regulators mark an improvement in industrial gas regulation. Some of their outstanding features are: removable valve pocket and orifices; side hand holes; stream-lining that directs the flow of gas, increasing capacity and range;* pressure reduction from pounds to pounds, and pounds to inches W. C.; single or double valve construction; spring or dead weight type adjustment and equipped with or without pilot control.

*Body of Regulator is so machined that a pounds to pounds diaphragm casing, or a pounds to inches W. C., diaphragm casing may be used or interchanged. Also equipped with removable inlet spool with orifices which permits installation of various sizes of orifices while regulator is in pipe line.

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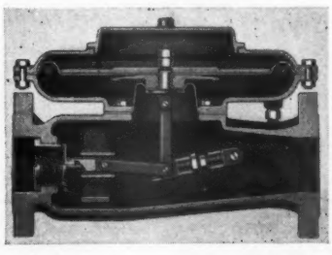
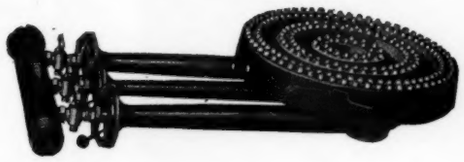


Above—Cross-sectional view of dead weight, single valve, toggle type, flanged Regulator for industrial use, for pounds to pounds, or pounds to inches W. C.

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

JOHNSON
RING BURNERS



Johnson 60BCE Ring Burners are extensively used because of their efficiency, economy, and adaptability. The 60BCE type consists of three ring burners which may be used singly or in any combination. Complete details will be gladly furnished.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

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